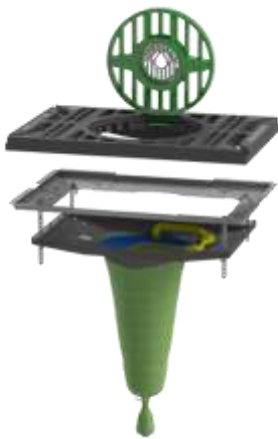




FROG CREEK PARTNERS, LLC

Device Application for Full Trash Capture
Certification of the Gutter Bin® Eco Drop Inlet
Filter and the Mundus Bag® water filter



*Gutter Bin® Eco Drop Inlet
Filter (DIF) with optional
Original Gutter Bin® grate*



*Gutter Bin® Eco Drop Inlet
Filter for Combination Inlets
(DIF-C)*



1. Cover Letter

January 7th, 2020

Eileen Sobeck
Executive Director
California State Water Resources Control Board
Division of Water Quality
P.O. Box 100
Sacramento, CA 95812-100

Re: Application for Trash Treatment Control Device – Gutter Bin® Eco Drop Inlet Filter & Mundus Bag® water filter

Dear Director Sobeck:

Frog Creek Partners, LLC is pleased to submit this updated application for Certification as a Full Capture System - Trash Treatment Control Device for the Gutter Bin® stormwater filtration system Eco Drop Inlet Filter and the Mundus Bag® water filter. We submit this application in accordance with the California State Water Resources Control Board Trash Treatment Control Device Application Requirements and it includes the following minimum requisite sections:

1. Cover Letter
2. Table of Contents
3. Physical Description
4. Installation Information
5. Operation and Maintenance Information
6. Reliability Information
7. Field/Lab Testing Information and Analysis

I appreciate your review of our application and the work that you do to keep our watersheds clean. If you require additional information, please feel free to contact me at brian@frogcreek.partners or 307.439.9570.

With kind regards,



Brian Deurloo
President & Founder
Frog Creek Partners

1.A. General description of the Device.

The patent pending Gutter Bin[®] stormwater filtration system Eco Drop Inlet Filter (“DIF”) is a proven permanent or temporary stormwater filter for use in removing pollution from drop inlets. The DIF consists of five main components: 1) the under-grate frame, 2) the filter hanger with receiver, 3) the diverter screen or inlet screen for DIF-C Devices 4) the sampling port, and 5) the patent pending Mundus Bag[®] water filter. The DIF is installed under the drop inlet’s existing storm drain cover. The DIF’s adjustable under-grate frame (UGF) is placed on the grate shelf under the storm grate and acts as a frame to suspend and secure the other DIF components. A filter hanger with a circular opening (aka receiver) and a progressive overflow trash screen is suspended below the UGF. The distance between the UGF and the filter hanger acts as an overflow which can be adjusted by raising or lowering the filter hanger in relation to the UGF. For combination inlets with curb inlet openings under the sidewalk, the DIF can be fitted with a diverter screen or inlet screen to direct water entering the curb inlet opening onto the filter hanger (this product configuration is known as the DIF-C). Collectively, the DIF and DIF-C are referred to in the remainder of this application as “Device” or “Devices”.

A removable and flexible Mundus Bag[®] water filter is placed in the circular receiver of the Device’s filter hanger. The reusable or single-use Mundus Bag (“MB”) water filter, when used in conjunction with the Devices, captures 100% of trash 5mm or greater in size because the MB’s maximum orifice size is less than 5mm. The MB drops into the Device’s filter hanger receiver and captures target pollutants while retaining pollution with an integrated backflow preventer. The Device’s filter hanger channels water to flow through the flexible MB to remove 100% of trash from stormwater inlets.

The modular and scalable design of the Device allows it to fit within a variety of drop inlet configurations and catch basin sizes. A circular version of the DIF is available to fit round drop inlets. The Device captures a wide range of pollutants including trash, gross pollutants, vegetative waste, sediment, hydrocarbons, and heavy metals. The Device is a passive, gravity flow device that allows water to bypass the MB in high flow events by overflowing the filter hanger, thereby minimizing flooding risks. The Device also allows water to bypass even if the MB is 100% full of material or if stormwater flow exceeds the MB’s hydraulic capacity. A progressive overflow trash screen surrounds the filter hanger and allows water to flow through the perforated trash screen while also retaining material 5mm or greater in size. The Device requires routine maintenance to remove captured pollutants and/or replace filtration media on an as-needed basis.

The Mundus Bag[®] water filter is used in conjunction with the Gutter Bin[®] stormwater filtration system products to remove 100% of trash from stormwater inlets. The MB is unique because it allows for customizable pollution removal, backflow prevention, and

adjustable sizing. The MB can be adjusted to different lengths and also cleaned through the bottom of the filter, rather than just the top like other types of stormwater filters. Frog Creek Partners (FCP) offers a variety of sizes and filtering configurations to suit the customer's and environment's needs. The MB's flexible design allows it hang straight or bend within irregularly shaped or shallow catch basins. Total trash capture model Mundus Bags (TTC-MB) are reusable and are standard on all Devices. Other MBs that provide additional filtration are optional and may have limited reusability but still allow for full trash capture. For example, the Mundus Hoop, MB trash capture model, and some MYCLEX media is reusable and the MBs with sediment lining are generally single use.

Optional filter media may be added or attached to the MB to provide additional filtration or vector control management including but not limited to:

- 1) MYCELX filter media (MYCELX is an anti-fungal, anti-microbial and certified environmentally safe media that removes fuel, oil, grease, emulsified oils, pesticides, and heavy metals from water);
- 2) Proprietary activated carbon-based filtration pillows for heavy metal removal;
- 3) Non-woven or woven filter material (usually geotextile); and/or
- 4) Perforated metal filter basket (with or without a releasable bottom closure).

1.B. The applicant's contact information and location.

Corporate contact:

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1.C. The Device's manufacturing location.

Frog Creek Partners' Devices and Mundus Bags are designed and manufactured in the United States. FCP engages multiple manufacturing subcontractors to produce all or part of the metal and fabric components with strict QA/QC oversight by Frog Creek Partners. Gutter Bin Eco Drop Inlet Filters are assembled at the FCP manufacturing facility in Casper, Wyoming and the MBs are fabricated in Casper, Wyoming.

1.D. A brief summary of any field/lab testing results that demonstrate the Device's functions as described within the application.

The Frog Creek Partners' Gutter Bin Eco Drop Inlet Filter system and MB water filter successfully captured and retained 100% of trash 5mm or greater in size in multiple tests in water flows that exceeded a design one-year, one-hour storm event. Repeated tests successfully captured cigarette butts and trash without resuspension given the MB's high storage capacity, low differential pressure, and backflow preventer. The MB's large screen openings (less than 5mm in size) allowed ample hydraulic capacity and did not blind from sand and sediment loading. Additionally, the progressive overflow trash screen proves to be an excellent mechanism to capture trash during extremely high-volume simulated storm events.

Multiple third party validated field and lab tests proved the Devices' successful performance. FCP conducted the lab test at FCP headquarters in Casper, Wyoming. FCP used a "trash recipe" as recommended by Stormwater Environment Manufacturers Association (SWEMA). The Device captured 100% of the trash recipe in flowrates ranging from 50 gpm to 500 gpm. Multiple MB models were tested to ensure that the both the TTC-MB (Total Trash Capture MB) and the TDS-MB (Trash, Debris & Sediment MB) performed to State Water Resource Control Board ("SWRCB") requirements for 100% trash capture.

100% trash capture test results = SUCCESSFUL - PASS TEST.

1.E. A brief summary of Device limits, and operational, sizing, and maintenance considerations.

Limitations

The Device's limitations are one of the DIF's strongest attributes as the product has few limits. Albeit, the MB does have limited capacity to hold pollutants before it needs to be replaced or evacuated, but this can be solved by installing the largest MB possible for the catch basin and by scheduling regular maintenance. Field test prove that a 13" MB can hold over 150 pounds of sediment and a 16" MB can hold over 200 pounds of sediment if both are fastened at a depth of approximately 3.5 feet below the Mundus Hoop. Industrial grade thread and high-quality sewing prevent the MB from ripping at the seams. The MB can be configured to capture sediment, heavy metals, hydrocarbons and 100% of trash. The UV protected and industrial strength fabric used in the MB may need replacement every one (1) to two (2) years depending upon the fabric or filter media used. To avoid fabric limitations, a metal basket of the anticorrosive type may be used to maximize filtration media life. The fabric style MB is preferred because of its ease of maintenance and flexible nature.

Operation

The Device has very few moving parts and is a passive filtration device. Once installed, minimal operational oversight is required except during servicing. One can easily introduce vector controls in, around, or under the Device. The vector control devices/media can be placed in, around, or below the Device including:

- 1) attached to the surface of the filter hanger or frame;
- 2) inside the MB;
- 3) placed on the filter hanger of the Device so the vector control material is washed into the catch basin during the next storm; and/or
- 4) through the sample port and below the Device in the catch basin.

Sizing

FCP offers custom made and adjustable Devices to fit a plethora of drop inlet configurations. The. FCP has a library of design templates to choose from and can provide Devices to fit nearly any size and style drop inlet or combo inlet configuration. FCP (or designee) measures and records each catch basin prior to engineering so the fit and function align with the Engineer's requirements for a specific application. The fact that the UGF is adjustable allows the Device to fit in almost any length or width drop inlet. Additionally, the distance by which the filter hanger is suspended below the UGF and the overall MB length can be adjusted so that the Devices can fit both deep and shallow drop inlet catch basins with varying hydraulic capacities. The smallest MB currently made by FCP is 9 inches in diameter so a catch basin smaller than 12" x 12" may require a custom sized MB. As an alternate configuration, the Device's filter hanger can be constructed to accept multiple MBs side by side for high aspect ratio drop inlet configurations.

Maintenance

The Device is one of the most easily maintained storm inlet filters on the market. Experience has proven that the DIF and MB can be manually cleaned within three to five minutes per maintenance cycle. The Device, as all storm drain filter systems, has its own unique maintenance interval requirements that depend upon local climate, pollution load, staffing, and network infrastructure. Low traffic area installations may only need to be inspected and/or maintained once per year. High traffic areas with frequent gatherings of people and sensitive discharge requirements may require monthly Device inspection and/or maintenance. FCP recommends that each Gutter Bin be inspected at least twice per year to ensure proper function and filtration.

Maintenance frequency is also driven by the intensity of filtration efforts. For example, industrial facilities who require sediment, heavy metal, hydrocarbon, and trash (SHHT) removal may need more frequent inspection to stay in compliance with their industrial general permit (IGP). FCP offers the SHHT-MB to remove the SHHT contaminants. Maintenance is performed by removing the inlet cover (aka storm grate), visually inspecting the Device, and removal/replacement of the filter media and MB. Depending on the type of MB used, it may either be emptied of pollutants and reused; or the MB may be disposed of and replaced. Once maintained, the inlet cover is replaced.

[1.F. Description or list of locations where Device has been installed.](#)

The city of Santa Maria, California is the site of a field test of the Device since January 2019. The Carpinteria Fire Department is also the site of a field test where the customer requires trash and hydrocarbon removal since July 2018. The customer performs the service at these locations.

Outside of California, the following cities use the Devices for stormwater pollution capture:

- Parker, Colorado
- Colorado Springs, Colorado
- Denver, Colorado
- Vail, Colorado
- Cheyenne, Wyoming
- Casper, Wyoming
- Sheridan, Wyoming
- Jackson Hole, Wyoming

[References available upon request.](#)

1.G. Certification Clause.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons that manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.



Brian Deurloo
President
Frog Creek Partners, LLC

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Table of Acronyms

Abbreviation or Acronym	Explanation	Abbreviation or Acronym	Explanation
		<i>l</i>	liters
<i>AOS</i>	apparent opening size	<i>lbs</i>	pounds
<i>ARS</i>	automatic retractable screen	<i>m</i>	meters
<i>bbls</i>	barrels	<i>MB</i>	Mundus Bag® water filter
<i>BFP</i>	back flow preventer	<i>MFH</i>	manhole frame hanger
<i>BMP</i>	best management practice	<i>MH</i>	Mundus Hoop
<i>CAMP</i>	Clean and Measure Pollution Service	<i>min</i>	minutes
<i>CDC</i>	Center for Disease Control	<i>mm</i>	millimeters
<i>CFS</i>	Channel Filter System	<i>MS4</i>	municipal separate storm sewer system
<i>cfs</i>	cubic feet per second	<i>MVCAC</i>	Mosquito Vector Control Assoc. of California
<i>CIF</i>	Curb Inlet Filter	<i>ND</i>	non detect
<i>cm</i>	centimeters	<i>NDA</i>	nondisclosure agreement
<i>COB</i>	close of business	<i>NJCAT</i>	New Jersey Corporation for Advanced Technology
<i>CRM</i>	customer relationship manager	<i>NPDES</i>	National Pollutant Discharge Elimination System
<i>CSS</i>	combined sewer system	<i>OD</i>	outside dimensions
<i>dia</i>	diameter	<i>OGB</i>	Original Gutter Bin
<i>DIF</i>	Drop Inlet Filter	<i>PCT</i>	Patent Cooperation Treaty
<i>DIF-C</i>	Drop Inlet Filter for Combination inlets	<i>PE</i>	professional engineer
<i>dp</i>	differential pressure	<i>POA</i>	percent open area
<i>EOP</i>	end of pipe	<i>PPE</i>	personal protection equipment
<i>EOY</i>	end of year	<i>PPP</i>	public private sponsorships
<i>EPA</i>	Environmental Protection Agency	<i>PSI</i>	pounds per square inch
<i>FCP</i>	Frog Creek Partners	<i>s</i>	seconds
<i>FH</i>	Filter Hanger	<i>SAT</i>	suspender anchor tab
<i>ft</i>	feet	<i>SHHT</i>	Sediment, Heavy Metals, Hydrocarbons, Trash
<i>ga</i>	gallons	<i>SPCC</i>	Spill, Prevention Control, and Countermeasure
<i>GAC</i>	granulated activated carbon	<i>SS</i>	stainless steel
<i>GB</i>	Gutter Bin® stormwater filtration system	<i>SWEMA</i>	Stormwater Environment Manufacturers Assoc.
<i>GPM</i>	gallons per minute	<i>SWPPP</i>	Stormwater Pollution Prevention Plan
<i>ID</i>	inside dimension	<i>SWRCB</i>	Stormwater Resources Control Board
<i>IF</i>	Interface Funnel	<i>TAPE</i>	Technology Assessment Protocol - Ecology
<i>IFE</i>	interface funnel extender	<i>TDS</i>	trash debris & sediment (for Mundus Bags)
<i>IGP</i>	Industrial General Permit	<i>TDS</i>	total dissolved solids (for water sampling)
<i>in</i>	inches	<i>TMDL</i>	Total Maximum Daily Load
<i>IP</i>	Intellectual Property	<i>TSS</i>	total suspended solids
		<i>TTC</i>	total trash capture
		<i>UGF</i>	Under Grate Frame
		<i>USPTO</i>	United States Patent and Trademark Office

3. Physical Description

3.A. Description of how the Device works to trap all particles that are 5mm or greater in size and how it is sized for varying flow volumes.

The Device's components are arranged to employ a shingling effect to direct water into the filter hanger; much the same way shingles on a roof overlap to allow water to cascade down a roof. The inside dimension (ID) of the under-grate frame (UGF) is greater than the outside dimension (OD) of the filter hanger that is suspended below the UGF. Water travels vertically through the storm grate and onto the UGF and then it cascades downward onto the filter hanger. The filter hanger is sloped towards a receiver where the MB water filter is placed. The MB hoop diameter is slightly larger than the receiver's diameter in the filter hanger thereby preventing the MB hoop from falling through the receiver. The Device's filter hanger positions the MB near the center of the catch basin and directs stormwater into the MB so that pollutants can be filtered from the water as it flows through the filter media. The filter hanger can accommodate one or more MBs depending upon the aspect ratio of the storm drain. Longer and narrower storm drains may accommodate two (2) MBs side by side to increase pollution capture capabilities, hydraulic capacity, and increased service interval.

In the alternate DIF-C configuration for combination drop inlets, stormwater entering the curb inlet opening is directed onto the filter hanger and into the MB by a diverter screen attached to the filter hanger and below the curb inlet opening. The diverter screen is perforated with holes less than 5mm in size and may embody diverter wings on either end to channel water/pollution from the corners of the inlet and into the MB. As an alternative to the diverter screen, an inlet screen can attach to the curb inlet opening entrance to prevent any trash 5mm or greater in size from entering the curb inlet. The inlet screen is sloped to prevent clogging and has an opening at the top to allow high flow water to bypass the inlet screen thereby preventing flooding. Neither the diverter screen nor the inlet screen affects the means by which vector control accesses the sampling port. Vector control personnel can operate any of the vector control sampling port options with either the diverter screen or the inlet screen present.

Devices are sized to fit each catch basin. As a result, the Device size is directly proportional to the size of the catch basin and performance characteristics generally scale with the increase overall hydraulic capacity of a larger frame. The Device is adjusted for length and height to fit the full dimensions of the drop inlet's grate shelf. The area between the top of the Device's filter hanger and the bottom of the UGF acts as the bypass (aka overflow). The greater the distance between the UGF and the filter hanger equates to greater overflow capacity.

The Device and the MB incorporate the following design features to ensure full capture of all particles 5mm or greater in size:

- An adjustable backflow preventer at the mouth of the MB prevents resuspension or expulsion of captured pollutants in times of high precipitation or system backflush;
- The top of the Device's filter hanger is rimmed with a progressive overflow trash screen that is approximately 2 inches high and maximum aperture openings of less than 5mm in size. If the MB is unable to accommodate the volume of water due to quantity or previously captured pollution, then the trash screen will allow water to overflow the filter hanger while still capturing trash 5mm or greater in size. An extremely high flow of water will overtop the trash screen which allows water to drain from the streets and prevent flooding;
- High flow and downward pressure of water causes trash to pack near the bottom of the MB; and
- No holes in the Device or MB that exceed 5mm in size except in bypass/overflow area.

The filter media normally comprises of polypropylene netting material with a maximum aperture size of less than 5mm in size. An expandable and adjustable backflow preventer at the entrance to the filter media can expand to accept larger trash during high flow and can constrict at low flow, thereby capturing and retaining 100% trash. The bottom of the MB is fastened to prevent trash loss but can be opened during service to allow pollutants to drop out for MB reuse.

The MB's net material has excellent wear & tear characteristics, UV protection, and chemical resistance. The MB's flexible structure allows installation in a variety of environments and catch basin configurations. The net material normally comprises of polypropylene or propylene but can be substituted with any other suitable material(s) (i.e. plastic, fiberglass, fabric, carbon, etc.) that capture trash 5mm or greater in size. FCP can also offer a more rigid style filter media in the form of a perforated basket constructed of plastic, stainless steel, carbon, or other material that suits the environment and customer's needs. The rigid style basket offers greater longevity with the same 100% trash capture capabilities but, is less flexible in shape.

The adjustable overflow of the Device is variable depending upon the environment's hydraulic requirements and the catch basin's depth. For example, a catch basin that is sufficiently deep (>24") can be fitted with a Device with up to a 24 inch in depth adjustable overflow (see 3.C. for more information).

A typical MB for DIF and DIF-C applications comprises of:

- **Mundus Hoop (“MH”)**: a reusable hoop that serves as a rigid connection mechanism between the MB and the Device’s filter hanger and receiver. The MH can also be permanently integrated to the MB;
- **Anchor Wrap**: industrial grade fabric and expandable closure located at the top of the MB to fasten the MB to the MH;
- **Lifting Strap**: a strap attached to the anchor wrap allows for lifting, handling, and weighing of the MB;
- **Backflow Preventer (“BFP”)**: an adjustable and flexible device located at the inlet of the MB to prevent captured pollutants from escaping the filter during high water flow or system backflush;
- **Filter Media (“FM”)**: a porous media incorporated to the MB that allows water to flow through while capturing target pollutants. A typical FM used with the trash capture MB is a chemical and UV resistant polypropylene netting with a 4.9mm maximum aperture size. Alternative filter media such as geofabric, MYCELX, and activated carbon can also be used to capture sediment, hydrocarbons, and heavy metals. Alternatively, a removeable perforated rigid basket can be used as a gross pollutant trap; and
- **Bag Tie**: a removable fastener attached to the bottom end of the MB to provide closure. A removable bag tie allows a service technician to dump contents from the bottom of the MB.

FCP can provide specialty MYCELX infused products to safely capture and retain hydrocarbons from stormwater in a plethora of configurations and environments. FCP is seeking partnerships and facilities to explore ways to recycle components of the MB water filter and its captured pollutants.

The patent pending MB has many advantages, including:

- 100% trash capture and retention;
- Easily cleaned – pull, dump, replace;
- High quality – UV resistant, chemical resistant, tear resistant material;
- Flexible tubular shape – fits in more places than rigid baskets;
- Adjustable and expandable backflow preventer – opens/closes to accept large pollutants and prevents loss of captured pollutants;
- Adjustable height – for shallow and deep applications;
- Customizable filtration – targeted pollution removal to fit the environment;
- Easily lifted – lifting strap allow person or machine to lift and weigh bag;
- Reusable – the total trash capture (TTC) model is reusable;
- Disposable – The TTC-MB and TDS-MB can also be thrown away;

- Closure strap – the MB can be cinched up tight on both ends to encapsulate trash for cleaner disposal;
- No vacuum truck needed – an industrial vac truck requires a lot of maintenance, it's highly intensive to run, and the removed pollutants from other devices must be decanted, loaded and hauled to a dump;
- Cleaned by vac truck – a vac truck crew can evacuate the contents of an MB with proper instruction by FCP and minor alterations to the standard MB;
- Minimal waste handling – the MB and/or the trash only needs to be handled once. Where a vac truck requires the waste to be handled three times (suck, decant, load, haul, dump at landfill);
- MYCELX capable – one of the cleanest hydrocarbon capture medias on the market. So much so, it is approved for use in the Galapagos National Park and certified environmentally safe by Lloyds Register Marine and Shipping; and
- Environmentally friendly - FCP is seeking partnerships and facilities to explore methods to recycle components of the MB water filter and/or its captured pollutants.

3.B. Design drawings for all standard Device sizes including dimensions, and alternative configurations.

Please refer to Appendix C for design drawings and Device specifications. The Device's UGF is adjusted to fit the width and length of the drop inlet catch basin. The four corners of the UGF are a common part. FCP can provide any size spacers for different sized catch basins; even bent grates. The Devices are offered in custom or adjustable sizing. FCP has a library of design templates to choose from and can provide Devices to fit nearly any size and style drop inlet. FCP (or designee) measures records each catch basin prior to engineering so the fit and function align with the Engineer's requirements for a specific application.

The Engineer is a person who designs, builds, specifies or maintains stormwater infrastructure for FCP's customer or end-user.

The fact that the UGF is adjustable allows the Device to fit in almost any length or width drop inlet. Additionally, the distance by which the filter hanger is suspended below the UGF and the overall MB length can be adjusted so that the Devices can fit both deep and shallow drop inlet catch basins with varying hydraulic capacities (outlet capacity). As an alternate configuration, the Device's filter hanger can be constructed to accept multiple MBs side by side for high aspect ratio drop inlet configurations for longer service intervals.

The Device is engineered to fit the following rectangular catch basin dimensions:

- Length (measured parallel to the street): 12 to 72 inches
- Width (measured perpendicular to the street): 12 to 72 inches

The Device is engineered to fit the following round catch basin dimensions:

- Diameter (measured parallel to the street): 12 to 72 inches

The Device can be altered, or custom made to suit the customer's need and the environment in which it operates.

The alternative Device configurations comprise of:

1. **Diverter Screen & Diverter Wings:** for combination inlets with curb inlet openings under the sidewalk, a diverter screen and diverter wings can be attached to the filter hanger to direct water onto the Device's filter hanger and into the MB. The diverter screen is situated approximately six to eight inches below the curb inlet opening and directs water spilling in from the curb inlet opening onto the filter hanger and into the MB. This is an advantage because trash does not accumulate at street level with this orientation, but it can be slightly more difficult to clean the diverter screen because it is below the curb inlet opening. One should choose the diverter screen over the inlet screen if trash accumulation at street level is not preferred. Either the diverter screen or inlet screen should be used for catch basins with a curb inlet opening to achieve 100% trash capture. The diverter screen does not affect the means by which vector control accesses the sampling port. Vector control personnel can operate any of the vector control sampling port options with the diverter screen present. As previously mentioned, this configuration is referred to as DIF-C;
2. **Inlet Screen:** an inlet screen can be placed in the curb inlet opening that prevents trash 5mm or greater in size from entering the curb inlet. This inlet screen is engineered and installed allow water to bypass the inlet screen during high water events (i.e. greater than one year, one hour events). The inlet screen is installed at street level and prevents trash from entering the curb inlet opening and directs trash to fall into the storm grate and filtered by the MB. Compared to the diverter screen, the inlet screen is easier to access and clean because it is at street level. One simply wipes off the surface of the inlet screen to cause trash to fall off. One should choose the inlet screen over the diverter screen if trash accumulation at the street level is preferred which can aid in street sweeping activities. Either the diverter screen or inlet screen should be used for catch basins with a curb inlet opening to achieve 100% trash capture. The inlet screen does not affect the means by which vector control accesses the sampling port. Vector control personnel can operate any of the vector control sampling port

options with the inlet screen present. As previously mentioned, this configuration is referred to as DIF-C;

3. **Original Gutter Bin Grate:** The Devices can be covered with an optional Original Gutter Bin grate (OGB) instead of a typical cast iron grate. The OGB is HS-20 load rated and has a hinged access hatch directly over the MB to provide easy access for inspection and servicing. The OGB is not required for stormwater filtration, it is simply an optional replacement for a cast iron grate. Please see Appendix C for more information;
4. **Automatic Retractable Screen (ARS):** An ARS can be used in conjunction with the Devices. FCP does not manufacture nor install ARS devices, but the DIF can be installed in a combination inlet that employs the use of an existing or proposed ARS. If an ARS is used in conjunction with the DIF (and/or optional OGB), then a diverter screen or curb inlet screen is likely not required since the ARS will prevent trash from entering the curb inlet opening if properly constructed, installed and certified by the SWRCB. An ARS does not affect the means by which vector control accesses the sampling port. Vector control personnel can operate any of the vector control sampling port options with an ARS present;
5. **Mundus Bag:** can be in flexible or rigid structure as described in the application;
6. **Sampling/View Port:** Device can be equipped with a sampling port located on the Device's filter hanger or UGF. The sampling port can also be used for vector control inspection and servicing. *The Sampling/View Port is mandatory in California.*



Image 1 - Custom zebra edition optional Original Gutter Bin grate

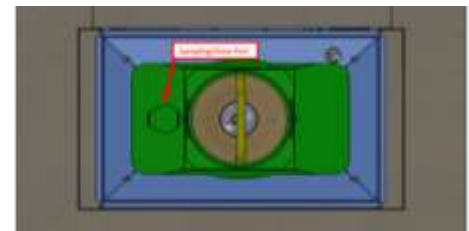


Figure 1 – Sampling/View port (5" in diameter)

3.C. If the Device is designed with an internal bypass, explain how the bypass only operates for volumes greater than the design storm.

The Device's bypass (aka overflow) is located above the filter hanger and MB water filter. The bypass becomes active when the stormwater flow exceeds the hydraulic capacity of the MB or when the MB is full of material. In these cases, the water spills over the side of the filter hanger and enters bypass mode while the MB continues to filter stormwater. All TTC-MB and TDS-MB model MBs have the hydraulic capacity to

handle a one (1) hour, one (1) year design storm event prior to entering bypass mode. See Appendix C for the hydraulic calculations of the MB water filter.

The Device has an adjustable overflow that acts as an internal bypass. The adjustable overflow is formed by the space between the bottom of the UGF and the top of the suspended filter hanger. This overflow can be adjusted by raising and lowering the filter hanger based on the hydraulic capacity needs of the environment and the relative depth of the catch basin. For example, if the catch basin has a 12" outlet pipe, then the Device overflow open area must be equal to or greater than the open area of the outlet pipe; in this case 113 sq. in. A DIF with filter hanger dimensions of 30" long and 18" wide set to an overflow depth of 2" below the UGF achieves an open area of 192 sq. in. (which is 70% greater than the hydraulic capacity of the 12" outlet. The MB adjustable overflow can be adjusted to 8 inches or more in depth. Therefore, the unique design of the Devices provides unparalleled overflow capability.

The adjustable overflow forms a space in which stormwater will overtop the edges of the filter hanger and cascade down to the bottom of the catch basin. As an added level of trash capture, a progressive overflow trash screen approximately 2 inches high and maximum aperture openings of 4mm surrounds the top of the Device's filter hanger (required on all California models). If the MB is unable to accommodate the volume of water due to quantity or previously captured pollution, then the trash screen will allow water to overflow the filter hanger while still capturing trash 5mm or greater in size. In normal operation, water will only exceed the progressive overflow trash screen and bypass the filtering capabilities of the Device under extreme weather situations or if the Device is not properly maintained and captured pollutants significantly decrease the flow capacity of the MB.

The Engineer is responsible for confirming that the flowrate and bypass capacity of the Device meet or exceed infrastructure and hydraulic capacity requirements.

[3.D. Engineering plans/diagrams for a typical installation.](#)

Typical installation configuration engineering plans may be found in Appendix C.

[3.E. Photographs, if any, of pre-and post-installation examples.](#)

Photographs showing the typical installation of the Device are found below.



Image 2 – Adjustable DIF with closed sample port and without a Mundus Bag



Image 3 – Installed custom made DIF-C with Mundus Bag, diverter screen, diverter wings, and sample port location



Image 4 – Installed DIF-C below the existing storm grate cover and an inlet screen in curb inlet opening



Image 5 - Installed DIF-C with diverter screen and optional OGB grate (access hatch closed)



Image 6 - DIF with progressive overflow trash screen



Image 7 - DIF with progressive overflow trash screen with Mundus Bag register visible in filter hanger



Image 8 - Demonstrating Mundus Bag removal for a DIF with grate removed



Image 9 - Demonstrating Mundus Bag removal for a DIF



Image 10 – Opening the sample port through the optional OGB grate with access hatch in locked open position and Mundus Bag installed



Image 11 - Demonstrating the closing of the OGB access hatch



Image 12 - Installation of an optional OGB grate for a DIF-C



Image 13 – Optional Custom OGB in front of United State Olympic Basketball Headquarters



Image 14 – Open hinged sample port located on UGF to view catch basin



Image 15 – Opening pivot sample port through grate hole with 1" PVC pipe



Image 16 – perspective view of a DIF-C with cast iron grate.

3.F. Device maximum trash capture capacity.

The calculation for the MB trash capacity is very simple with the formula (*radius and height in inches*):

$$(3.14 \times r^2 \times h)/1,728 = \text{volume (cu. ft.)}$$

$$(\pi) \times (\text{radius squared} \times \text{height})/ (1,728 \text{ cubic inches/ft}^3) = \text{volume in cubic feet}$$

Table 1 - Mundus Bag® water filter specifications

Model	Bag dia (inches)	Max capacity (cu.ft)	Aperture size - particle retention (mm) (X 1000 for micron)	Min/Max length of filter (in)	Max capture load (lbs)	Max load rating of filter bag (lbs)	Empty bag flow rate (gpm)	Reusable	Est. useful life (months)
TTC-9	9	1.77	3.5	12/48	33	291	1,037	Yes	6-18
TTC-90*	90	1.77	3.5	12/48	33	291	2,074	Yes	6-18
TTC-13	13	3.14	3.5	12/48	99	517	2,153	Yes	6-18
TTC-14	14	4.27	3.5	12/48	80	704	2,515	Yes	6-18
TTC-16	16	5.58	3.5	12/48	104	920	3,447	Yes	6-18
TDS-9	9	1.77	0.21	12/48	342	291	1,037	No	3-12
TDS-90*	90	1.77	0.21	12/48	242	291	2,074	No	3-12
TDS-13	13	3.14	0.21	12/48	431	517	1,935	No	3-12
TDS-14	14	4.27	0.21	12/48	587	704	2,125	No	3-12
TDS-16	16	5.58	0.21	12/48	766	920	2,428	No	3-12
HST-9	9	1.77	0.21	12/48	242	291	1,037	Partial	3-12
HST-90*	90	1.77	0.21	12/48	242	291	2,074	Partial	3-12
HST-13	13	3.14	0.21	12/48	431	517	1,935	Partial	3-12
HST-14	14	4.27	0.21	12/48	587	704	2,125	Partial	3-12
HST-16	16	5.58	0.21	12/48	766	920	2,428	Partial	3-12
SHHT-9	9	1.41	0.10	24/72	194	233	410	Partial	3-12
SHHT-90*	90	1.41	0.10	24/72	194	233	820	Partial	3-12
SHHT-13	13	2.51	0.10	24/72	242	414	581	Partial	3-12
SHHT-14	14	3.42	0.10	24/72	431	563	637	Partial	3-12
SHHT-16	16	4.47	0.10	24/72	587	736	728	Partial	3-12

Please refer to the MB specification sheet in Appendix C for specific filter media capacities.

The same sizing variances can be applied to the rigid style filter media for maximum trash capture and extended service intervals. Field experience has shown that the 13” total trash capture model Mundus Bag (TTC-MB) can easily hold up to 70 pounds of trash and debris. Additionally, field experience demonstrates that a 13” TDS-MB can hold over 150 pounds of sediment and a 16” TDS-MB can hold over 200 pounds of sediment when both are fastened at a depth of approximately 3.5 to 4 feet below the Mundus Hoop.

3.G. The Device hydraulic capacity (flow in cfs) at its maximum trash capture capacity for all standard Device sizes.

Please refer to the MB spec sheet in Appendix C for specific filter media hydraulic capacities.

The Devices and MB are designed for a filtering hydraulic capacity of at least a one (1) hour, one (1) year storm event. The smallest diameter total trash capture MB (TTC-9) can accommodate a flowrate of 2.31 cfs (1,037 gpm) when empty or half full. The average size MB for typical drop inlets is 13” (TTC-13). The TTC-13 can accommodate

a flowrate of 4.80 cfs (2,153 gpm) when empty or half full. If a flowrate into a storm inlet exceeds the maximum flowrate capacity of an MB, then the water will bypass the MB water filter through the overflow and thereby minimizing the risk of localized flooding.

Table 2 - Hydraulic capacity & trash capture volume for Mundus Bag model TTC-MB

MB dia. (in)	MB length (in)	Max flowrate of empty MB (cfs)	Max flowrate of MB half full (cfs)	Max capture volume (ft ³)
9	48	2.31	2.31	1.77
13	48	4.80	4.80	3.14
14	48	5.83	5.83	4.27
16	48	7.68	7.68	5.58

** Additional sizes of MBs may be added to product line to suit customer's needs. Any new sized MB's will meet or exceed a design storm as required by the State Water Board with 100% trash capture.*

The system maintains full hydraulic capacity until the MB is approximately 75% full. At this point, water accumulates on the filter hanger and trash is prevented from leaving the device by the progressive overflow trash screen before cascading around the filter hanger and into the catch basin. The Device will continue to function with full trash capture unless:

- 1) the progressive overflow trash screen experiences hydraulic capacity loss as pollutants blind off openings in the trash screen reducing the overall capacity of the Device to the point where water begins to overtop the progressive overflow trash screen and cascade into the catch basin unfiltered, or;
- 2) If the storm event exceeds the combined hydraulic capacity of the MB and progressive overflow trash screen.

The differential pressure (dP) created by the Device and MB is negligible when empty. The Device offers minimal flow resistance. The dP increases as the MB accumulates trash and debris when over half full.

As an example of the high flow capabilities of the Device, in a controlled test environment FCP introduced trash and 1.11 cfs (500 gpm) of water to a 36" x 24" DIF equipped with a 13" TTC-MB model MB. The tests were also performed using the TDS-MB model MB with similar results. The Device maintained 100% trash capture and complete water flow through the MB without bypass. Therefore, a properly sized Device can easily and effectively capture 100% of trash in a high flow environment and especially during the first flush.

The Device is also highly capable of capturing 100% of gross pollutants 5mm or greater in size during non-stormwater discharge (aka dry weather runoff). All low flow water and

pollution is funneled into the MB. The first flush of a rainstorm will push any pollutants into the MB that may be deposited on the filter hanger of the Device because the dry weather runoff may have lacked the volume to transport the pollutants into the MB.

3.H. Each material and material grade used to construct the Device.

The Device and MB are constructed of durable, weather resistant, high strength materials to provide a long service life. The materials used in the construction of the Device and the MB are as follows:

- **Device Under-Grate Frame (UGF):** Stainless steel (SS) of varying gauge;
- **Device Filter Hanger:** SS of varying gauge;
- **Diverter Screen & Inlet Screen:** SS of varying gauge;
- **Filter Hanger Suspenders:** SS of varying gauge, SS chain or rigid bar, and/or plastic;
- **Mundus Bag Hoop:** SS, fiberglass, or plastic of varying diameter or gauge;
- **MB Anchor Fabric:** marine grade, environmentally safe material;
- **MB Lifting Handle:** marine grade webbing;
- **Mundus Basket:** SS of varying gauge with orifice opening less than 5mm in size (rigid alternative to MB);
- **MB Netting Outer Shell:** polypropylene, propylene, or similarly durable fabric with orifice opening less than 5mm in size;
- **MB Closure Fastener:** industrial grade zip tie (or another fastener);

FCP uses stainless steel (SS) for the construction of the Devices but may use alternative environmentally safe materials for certain components (i.e. plastic, weathering steel, cast iron, carbon, fiberglass, rubber, silicone, etc.) if allowed by local, state and Federal regulations. California Device models are 100% stainless steel (or approved alternative). These materials are used throughout the entire line of Gutter Bin models and are the most durable materials available for these products. Adherence to current installation and maintenance procedures are required to ensure the design service life of the Devices and filter media.

3.I. Conditions under which the Device re-introduces previously trapped trash.

The Device is designed and engineered to capture and permanently retain all particles 5mm or greater in size. The backflow preventer (BFP) in the MB expands during high flow and restricts during low flow thereby capturing and retaining trash and pollution. The method in which the BFP captures and retains trash is similar to how a crab trap works - it is easy to enter but difficult to exit. Additionally, the progressive overflow trash screen acts as a second layer of defense against the reintroduction of previously

trapped trash. Conditions in which the Device and MB might reintroduce previously trapped trash include:

- If the Device becomes blinded because it is not properly maintained and pollutants are allowed to accumulate beyond the specified allowable limit, then water may accumulate on the filter hanger to such an extent that it will overtop the trash screen and overflow, thus bypassing the Device's filtration system;
- If the MB is damaged, then it may cause a condition that would allow for the reintroduction of captured pollutants. The filter media should be replaced if holes appear that are greater than 5mm in size;
- Unusual weather events that exceed the filter flow capacity of the Device may cause a condition that would allow for the re-introduction of captured pollutants;
- Backflow of the stormwater network may cause pollutants to reintroduce to the system. Backflow may be caused by a downstream stormwater network obstruction or from extreme tidal flows near coastal installations. The MB backflow preventer will prevent most, if not all, of the previously captured trash from escaping.

3.J. Estimated design life of the Device.

The DIF and DIF-C have a design life of 25 years assuming the proper installation, maintenance and service of the Device. The total trash capture (TTC model) MBs are reusable and have a service life of one (1) to two (2) years, depending upon site conditions. Trash, debris and sediment (TDS model) MBs with a liner and are a single use filter with a maximum service life of 12 to 18 months, depending upon site conditions.

3.K. Product Comparison

Removed at the direction of the California State Water Resources Control Board.

3.L. Optional components.

FCP offers the following optional components:

1. **Diverter Screen & Diverter Wings:** for combination drop inlets with curb inlet openings under the sidewalk, a diverter screen and diverter wings can be attached to the filter hanger that direct water onto the Device's filter hanger and into the MB. Either the diverter screen or inlet screen should be used for combination inlets to achieve 100% trash capture. See additional information in Section 3.B. As previously mentioned, this configuration is referred to as DIF-C;
2. **Inlet Screen:** a screen can be placed in the curb inlet opening that prevents trash 5mm or greater in size from entering the curb inlet entrance so all trash 5mm or greater is diverted into the storm grate cover and then into the Device.

This curb inlet screen can be fit to allow water to bypass the system during storms that exceed a one (1) hour and one (1) year storm event. Either the diverter screen or inlet screen should be used for combination inlets to achieve 100% trash capture. See additional information in Section 3.B. This configuration is also known as the DIF-C;

3. **Original Gutter Bin Grate:** The Device can be covered with an optional Original Gutter Bin grate (OGB) made of high-quality weathering steel (or other approved material). The OGB is engineered to HS-20 standards and has a hinged access hatch directly over the MB to provide easy access for inspection and servicing. The OGB replaces the old cast iron storm grate. The OGB is an optional component used to replace a cast iron grate. The OGB can be customized and branded for customers who want to participate in public private partnerships (PPP) and corporate sponsorship programs. Please see Appendix C for more information;
4. **Mundus Bag:** can be in flexible or rigid structure as described in the application;
5. **Filter Hanger Only:** there may be instances where a UGF is not necessary for the DIF installation and the filter hanger is suspended below the grate by anchoring it to the walls of the catch basin. This method also offers overflow capabilities without the UGF and the bypass can be adjusted with the suspension parts;
6. **Round DIF:** FCP offers a circular model of the Device for round drop inlets. The Device functions in a similar way as the normal rectangular DIF.
7. **Mundus Bag Sediment Liner:** nonwoven or woven fabric of varying thickness, apparent opening size (AOS) and sieve rating can be used as well as a number of other effective medias;
8. **Mundus Bag Proprietary Granulated Activated Carbon (GAC);** a proprietary mixture of environmentally safe media for heavy metal removal also known as Performer™.
9. **Vacuum Truck Friendly MB:** One of the main attributes of the Gutter Bin stormwater filtration system and the Mundus Bag water filter is that together they provide measurable and quantifiable results. This is because the MB is removable so it can be individually weighed to determine how much pollution is being recovered over time and location. However, many organizations prefer to use vacuum trucks (aka “vac trucks” or “suck trucks”) because it is easy for them. For this reason, FCP offers a vac truck friendly MB that can be locked into the filter hanger and embodies a more robust filter media that stands up to the rigors

of repeated vacuum cycles. The apparent opening size (AOS) for this media is less than 5mm in size to ensure full trash capture. The vac truck friendly MB comes in a rigid perforated SS basket form and a flexible fabric. The vac truck friendly MB fastens to the filter hanger in same way as the MB does and locks in.

It is important to note that the MYCELX Oil-Free Technology is proven to be an effective and safe hydrocarbon capture media that is used in sensitive areas around the world. MYCELX hydrocarbon capture media is approved by Lloyd's Register Marine and Shipping for environmentally friendly, type C emulsion, 99% hydrocarbon removal. MYCELX is approved for hydrocarbon removal in the Galapagos Islands, Galapagos National Park. Vessels operating in the Galapagos National Park Reserve are required to have a bilge water treatment system and MYCELX is approved for this application.

4. Installation Guidance

4.A. Device installation considerations.

Frog Creek Partners can provide detailed instructions in written format to the installer to ensure proper installation techniques. Further, FCP offers video instruction on our website and can also provide virtual reality (VR) videos for viewing with the installers' VR headset (FCP can also provide the customer/installer a VR headset for instructional purposes).

Device installation requires a hand trowel, wrench, silicone (optional), hammer, metal punch and grate puller (installs in about five (5) minutes with experienced crew and up to 15 minutes for unique inlet configurations).

Size & Placement Considerations

The following instructions are the fitting procedures and considerations for the Device and MB installation:

1. **Measure & Quantify:** Determine the following catch basin dimensions:
 - a. width and length of the drop inlet open area - inside dimension (ID);
 - b. width and length of drop inlet from outside of grate shelf – outside dimension (OD);
 - c. total depth of catch basin from grate shelf;
 - d. distance between grate shelf and top of outlet;
 - e. diameter of outlet pipe;
 - f. width, height and length of curb inlet opening (for DIF-C model);
 - g. dimensions of any obstructions within the catch basin than may impede Device insertion (ladder, grouting, abnormal catch basin configurations);

- h. thickest point of storm grate within 5 inches of the perimeter;
 - i. thickest point of the storm grate and the distance from the perimeter; and
 - j. FCP can provide measurement data sheets or access to the FCP filed app for customers to record catch basin measurements
2. **Sizing:** Select or engineer the appropriately sized Device based on the catch basin dimensions. FCP provides adjustable and custom built Devices for unusual drop inlet applications
3. **MB Selection:** Select the appropriate MB model based on the following considerations:
- a. Device filter hanger MB receiver size. Multiple diameters of MBs are available (e.g. 9", 13", 14" and 16" as outlined in the MB spec sheet in Appendix C) to fit the different sized Devices;
 - b. FCP offers the following models of Mundus Bag:
 - TTC-MB (Total Trash Capture Mundus Bag): standard MB offered in California for 100% trash capture with an apparent opening size (AOS) less than 5mm. This MB can be selected to capture 100% of trash.
 - TDS-MB (Trash, Debris, & Sediment Mundus Bag): optional MB that is tested and proven to capture 100% of trash 5mm or greater in size plus sediment and debris. This MB can be selected to capture other pollutants in addition to 100% trash.
 - SHHT-MB (Sediment, Heavy metals, Hydrocarbons & Trash Mundus Bag): optional MB that is tested and proven to capture 100% of trash 5mm or greater in size plus sediment, heavy metals, and hydrocarbons. The MB embodies MYCELX filter media to target the hydrocarbons and heavy metals. This MB can be selected to capture other pollutants in addition to 100% trash.
 - Vacuum Friendly Mundus Bag (VAC-MB): optional VAC-MB can be locked into the filter hanger and embodies a more robust filter media that stands up to the rigors of repeated vacuum cycles. The apparent opening size (AOS) for this media is less than 5mm in size to ensure 100% trash capture. The VAC-MB is offered in a rigid perforated SS basket form and a flexible fabric. This MB can be selected to capture 100% of trash.
 - c. Hydraulic capacity; and
 - d. Desired maintenance frequency.

4.B. Device installation procedures

Special Note: To ensure the best results and personnel safety, the catch basin and immediate areas should be thoroughly cleaned within one (1) week prior to Device installation to remove potentially hazardous material and objects from the work area.

1. Site Preparation:

- a. Deploy safety equipment, ensure proper PPE is worn, and necessary permits are in place (if necessary and as directed by Engineer). No confined space entry is required. (Engineer or customer is responsible for confined space determination and permit). All site preparation and installation activities can take place with personnel above the catch basin;
- b. Remove the drop inlet cover;
- c. Clean the immediate area and catch basin by hand or with a vacuum truck to remove debris from the catch basin;
- d. Clean the drop inlet grate shelf of existing pollutants or debris with hand trowel or gloved hand.

To ensure the best results and personal safety, the catch basin should be cleaned 1-7 days prior to Device installation.

2. Device Installation:

- a. Required tools: 7/16" wrench, metal punch, and hammer (the Device may require an alternative size wrench);
- b. Attach the filter hanger to the bottom of the UGF at a distance based on the depth of the catch basin and the desired maximum overflow hydraulic capacity. FCP recommends a minimum adjustable overflow of 2" inches. Ensure the filter hanger is horizontal when hanging in the catch basin. One can simply adjust the plane of the filter hanger by adjusting the suspender length. The Device can be adjusted to meet the slope and grade of about any environment;
- c. Clean the grate shelf of debris. Place the UGF on the drop inlet grate shelf and allow the filter hanger to suspend freely within the catch basin;
- d. To ensure a proper fit, adjust the UGF to expand or contract so the UGF adequately contacts the grate shelf so as not to fall into the catch basin. The UGF must overlap the grate shelf at least three-quarter (3/4) the distance between the shelf inside dimension (ID) and outside

dimension (OD) to adequately support the load of a full MB. For a one (1) inch grate shelf, the UGF must overlap the shelf by $\frac{3}{4}$ ".

- e. **(For Combination Inlets):**
 - i. **Diverter Screen & Diverter Wings** – fit diverter screen over banana clips and hold in position by inserting cotter pins at desired location above and below the diverter plate. Install wings at each end (or just upstream side for sloped installs) of curb inlet opening so the wings touch the side of the curb inlet opening to capture the pollution from trickling water. Fasten in place with $\frac{1}{4}$ " SS bolts or bendable tabs;
 - ii. **Inlet Screen** – place the inlet screen frame in curb inlet opening so it spans the length. Expand frame by using a $\frac{1}{2}$ " wrench to lengthen bolt which causes the frame expand and engage the walls of the curb inlet opening. Fit the screen gussets over the frame at predetermined locations marked by slots cut out of the frame. Cut the length of the screen to equal the width of the curb inlet opening. Place the screen over the frame and insert the fastening tabs thru the screen to secure the screen to the frame. Use a hammer to pound the tabs over thereby locking the screen in place. Span any gap between the inlet screen and the top of the storm grate with a flexible shield. The flexible shield connects to the inlet screen with rivets (or other environmentally safe fastener) and should contact the wall of the storm grate to achieve full trash capture during high flow events.
- f. **Optional:** fill any gaps that may be present between the walls of the inlet's grate shelf and the Device's UGF with silicone or other approved environmentally safe sealant;
- g. **Optional:** Record location and serial number information into the FCP Field App on mobile device.

3. MB Installation:

- a. Align the bends in the Mundus Hoop (MH) with the MB handle attachment points. The handle of the MB and the bends of the MH will be parallel with the street when inserted into the Device. This allows the handle to be draped over the MB handle hook so the handle does not impede water flow and the MB is easily removed during service. *In unusual cases, the handle may not be parallel to the street and the MB*

*needs to be inserted so the handle is parallel to the bends in the filter hanger register. **Always align the handle with the bends;***

- b. Hold the Mundus Hoop so the bend of the MH points downward. Pull the top of the MB thru the inside of the MH a few inches and fold the elastic anchor fabric over the top and outside of the MH. This secures the MB to the MH. (method is akin to pulling the top of a tube sock thru the inside of a bracelet and wrapping the top of the sock over the bracelet). The elastic band around the anchor fabric will hold the MB to the Mundus Hoop (MH). When the MB and MH are secured within the filter hanger, then the added friction will hold the MB in place and prevent it from falling through the filter hanger hole. Make sure that the handle is parallel with the bends in MH;
- c. Grab the handle or hoop of the MB, step on the bottom of the MB and pull snugly away from each other. This equilaterally aligns the MB around the MH;
- d. Secure the bottom of the MB with the recommended fastener at a position based on the desired overall length of the MB. NOTE: for shallower catch basins, the end of the MB may be trimmed to provide an overall shorter length. The MB should not be so long that it can block the outlet;
- e. Adjust the backflow preventer to design aperture by pulling the backflow preventer (BFP) cord and sliding the fastener into position. The BFP should usually be tightened at least a little bit for ease of maintenance later but not tightened so much that it prevents the inflow of trash. A four (4) to six (6) inch opening is usually sufficient for a TTC-13 MB BFP;
- f. Drop MB with MH into the receiver so the handle aligns with the bends in the filter hanger receiver and drape handle over handle hook, Adjust for a snug fit;
- g. Attach or place any additional filtration media inside or to the MB - *not required for full trash capture;*

4. **Installation Completion:** Replace the inlet covering and remove safety equipment.

Total Installation Time: about 5 minutes

4.C. [Methods for diagnosing and correcting installation errors.](#)

Frog Creek Partners maintains a rigorous quality assurance and quality control (QA/QC) processes and standards. Prior to the shipment of any Device or MB, each part is

inspected, and cross-referenced with the field measurements and capacity considerations. A manifest of each component of the Device is delivered to the customer and we recommend each customer perform an inspection upon receipt to confirm conformity to the desired application of the Device. FCP offers standard sized configurations, however there are instances where the Device has been customized or varies from typical designs. This is not an issue as long as the dimensions are documented. FCP can build Devices for about any drop inlet configuration.

Checklists are provided to assist each Device installation and maintenance visit:

Site Preparation and Selection:

- The drop inlet grate shelf is a uniform surface and of relatively plumb dimensions;
- There is enough space and depth for the installation of the Device, its adjustable overflow and MB to perform properly; and
- Prior to installation, the catch basin should be clean and be free of sediment, debris, and harmful pollutants like hypodermic needles, sharp metal, and broken glass.

Installation Error Considerations:

- The sides of the Device's UGF should nest snugly against the walls of the inlet's grate shelf without any significant gaps. Gaps may be filled using a California approved marine grade sealant (i.e. 100% silicone);
- The UGF should sit flush with the top of the inlet's grate shelf and allow the inlet's covering to be seated flush on top of the UGF with minimal rise. Some grate frames have notches or protrusions in them. One may need to slightly modify the UGF to accommodate inconsistencies in the storm grate or frame;
- The filter hanger must be allowed to be suspended freely under the UGF. Some catch basins may have structures that impede free suspension. Modifying the adjustable overflow (the distance between the UGF and the filter hanger) may rectify this situation;
- The MB hoop should fit snugly into the Device's receiver. The receiver and Mundus hoop are bent to fit one another. If the MB does not fit snugly, then the MB hoop be upside down, or the MB may need to be rotated to achieve a snug fit;
- The MB should be fully extended vertically to ensure maximum hydraulic capacity and trash capture capacity. If the catch basin is too shallow to allow for full extension, then either shorten the MB (see above) or curve the MB so it rests on the catch basin floor. However, under no circumstances, should the tail of the MB obstruct the outlet connector pipe as this can cause blockage or the outlet.

- In some instances, a storm grate cover may have alternate configurations where the grate has abnormally large structural beams under the grate to aid in load rating. Occasionally these structural beams can hit the Device and prevent a good fit. FCP can account for these inconsistencies if the catch basin and grate are properly measured prior to engineering; and
- It should be noted that some catch basins may be inadequately constructed and may be prone to retaining small amounts of water. This can cause proliferation of mosquito breeding. The preferred course of action is to repair any deficiencies in the catch basin construction that may cause standing water prior to installation of the Device. It is important that the deficient areas be visible and accessible by the mosquito vector control personnel if repairs to the catch basin have not occurred prior to Device installation. The Engineer and MVCAC personnel can make this determination.

The Device is designed to meet site-specific water quality filtration requirements. Conformance with the Engineer’s Plans and Specifications and proper installation is paramount to ensure proper Device operation.

4.D. Optional components guide: An explanation of the condition or circumstance that would necessitate the implementation of that component and render it no longer optional.

In the event that the site is a combination inlet with a curb inlet opening, the diverter screen or inlet screen must be used to maintain 100% trash capture. In the event the drop inlet is a bent grate (aka “valley grate”), a special spacer is used to accommodate the bend. For storm grates that have abnormally large structural beams under the grate, a high-profile UGF may need to be used to accommodate the beams so as to allow the storm grate to sit flush in the frame.

5. Operation and Maintenance Information

5.A. Device inspection frequency considerations, and inspection procedures.

Upon inspection, the MB water filter should be emptied if it is more than half full of trash and debris, or as directed by the Engineer, city, or contract. The MB can be 75% full and still work properly in most instances but allowing filtration capacity for future rain events is important.

During inspection, the following should be checked:

- Visually inspect the MB for abnormal pooling of water inside the bag. Pooling of water is indicative of a MB that requires replacement or emptying due to pollutants or debris blinding the openings in the filter;

- Pooling of water in the MB can also be indicative of hydrocarbon loading from stormwater runoff. Add MYCELX to remove hydrocarbons from stormwater to rectify the problem;
- Visually inspect the MB to determine if the filter media has any holes greater than 5mm in size. Replace MB if necessary;
- Visually inspect the Device to check if any significant gaps exist between the UGF and the inlet's grate shelf;
- Visually inspect the filter hanger for accumulated debris. Excessive accumulation of debris on the filter hanger or particularly the progressive trash screen may indicate a full MB that needs emptying or replacing;
- Visually inspect the diverter screen or inlet screen (if present). If either are covered with debris, then they should be wiped off to ensure proper filtration for future storm events;
- Inspect the DIF frame to make sure all components look or feel secure;
- Inspect after first rain event greater than ¼”;
- Inspect after every storm of ½” or greater;
- Inspect every one (1) to two (2) months during the first year than at least quarterly thereafter; and
- See 5.C. for more information.

5.B. Maintenance frequency consideration, procedures, and a description of necessary equipment and materials.

The Device may be serviced in one of two simple ways through manual maintenance or vac truck maintenance as described below:

Manual Maintenance:

To service the Device manually within three (3) to seven (7) minutes, follow these steps:

Equipment needed for manual maintenance: PPE, safety equipment, grate puller, broom, weight scale, FCP Field App mobile device, replacement media, disposal receptacle (trash bag, dumpster, trailer, etc.).

1. **Deploy safety equipment:** place cones around area and make sure it is safe to remove storm grate. Wear personal protective equipment (PPE). No confined space entry is required. The Engineer will make the final determination of necessary safety equipment, processes, and permits. All maintenance personnel may be above the catch basin during maintenance of the Device;
2. **Remove covering:** Use grate puller or another tool to remove the inlet to expose the Device;

3. **Stuff MB:** Push overflowing pollutions (if any) into the MB with hand tool or spray wand. Be sure to inspect the trash screen around filter hanger and remove any debris that may have blocked the screen;
4. **Remove & record:** Remove MB by lifting handle or hoop. Weigh the MB with a common crane scale (FCP can provide if necessary). Record weight of MB and any other pollution data such as density, pollutant type, etc. Dispose of pollutants properly and in accordance with local laws;
5. **Dump and dispose:** The MB has the unique capability of being reused or replaced. To dump, remove fastener at the bottom of the MB. Dump contents into approved receptacle. Alternatively, one can dispose of the whole MB if the filtration media is compromised. Dispose of filter media and captured pollutants in accordance with local regulations or as directed by the Engineer;
6. **Replace MB & cover:** Close the bottom of the MB with a zip tie or wire, replace the bag into the receiver on the Device's filter hanger, and replace the grate.

It is important to note that this method is the most efficient way to perform maintenance on a low volume of Gutter Bins and in space restricted areas. Service can be done in conjunction with a service hand cart, 4-wheeler with trailer/bed, or a pickup truck. A low height trailer can also be useful.

Vac truck maintenance: To service the Device with a vac truck within four (4) to twelve (12) minutes, follow these steps:

Equipment needed for vac truck maintenance: PPE, safety equipment, vacuum truck, cover removal tool, weight scale, FCP Field App mobile device, replacement media, disposal receptacle (vac truck vessel), and replacement media.

Prepare vac truck: deploy safety equipment (cones, lights, etc.) and vac truck for operation (turn on pumps, adjust valves, deploy boom, etc.). The Engineer will make the final determination of necessary safety equipment, processes, and permits. No confined space entry is required. All maintenance activities can take place with personnel above the catch basin.

1. **Remove covering:** Use hook or another tool to remove the drop inlet cover to expose the Device;
2. **Stuff MB (optional):** Push overflowing pollutions (if any) into the MB with hand tool or spray wand. Be sure to inspect the trash screen around filter hanger and remove any debris that may have blocked the screen;
3. **Record (optional):** Lift MB by pulling up the handle or hoop. Weigh the bag with a common crane scale. Record weight of MB plus any other pollution data such as density, pollutant type, etc.;

4. **Evacuate MB:** Vacuum contents out of MB. The bag may be sucked inside out so one may have to push the bag right side out and realign the MB. Be careful that the MB is not sucked into the vacuum. One may need to secure the MB to the MH to prevent loss of flexible filter media. A vac truck crew can evacuate the contents of an MB with proper instruction by FCP and minor alterations to the standard MB;
7. **Replace MB & cover:** replace the MB (or reuse existing MB if TTC-MB is used) into the receiver on the Device's filter hanger, drape handle over the handle hook, and replace the grate;
5. **Prepare vac truck for relocation:** gather safety equipment, turn off pumps, close valves, deploy boom, etc.

It is important to note that the use of a vac truck can be highly inefficient due to its maintenance requirements, truck purchase costs, and the fact that it requires the waste removed by a vac truck to be handled at least three (3) times before it reaches the landfill (suck, decant, load, haul, dump). It may also take a few minutes longer to service a Gutter Bin with a vac truck rather than doing it manually because of the set-up/take-down time required to operate a vac truck.

As with any manufactured device, there may be product limits that need acceptance or correction. At times, it may be prudent to relocate or modify the Device or move to another location as polluting behaviors and infrastructure changes.

Each Device installation is unique based on location conditions and targeted pollutants.

- The inspection frequency mainly depends upon climate events and pollutant load.
 - Inspect after the first and second rain event to ensure proper function (break-in period);
 - For construction sites, one should inspect the Device after each storm event greater than ½" of precipitation or heavy snow melt; and
 - For post construction and permanent installations, one should inspect the Device three (3) to four (4) times per year or as directed by the Engineer.

Maintenance frequency considerations include:

- **Typical pollutant load:** areas with bulky trash and debris may require more frequent service intervals to ensure that pollutants don't bypass the MB via the Device's adjustable overflow;
- **Local climate conditions:** areas with heavy rainfall or snowfall may require a more frequent maintenance cycle if pollutant load is high. During the autumn leaf

fall, more frequent maintenance may be required. High rainfall does not always equate to more frequent service visits;

- **Infrastructure constraints:** drop inlets with large drainage areas and high pollutant loads may require more frequent service intervals. Smaller drop inlets may require smaller diameter MBs thereby decreasing the pollutant capacity and shortening the service interval;
- **Type of MB being used:** Total Trash Capture (TTC-MB) model MBs typically have a longer service life than the Trash Debris & Sediment (TDS-MB) model MB because the TTC-MB allows anything smaller than 5mm to pass the filtration system. The VAC-MB can last for several years. Replace or empty a MB if it is more than 75% full or if MB water filter has blinded and as directed by the Engineer.

It is important that the Device be maintained to ensure proper function, minimize any pollution bypass and mitigate flooding risks during extreme weather events. The Engineer may prescribe an alternative means of maintenance per local regulations, site requirements, and/or contract requirement. Captured pollutants and spent media must be disposed of in accordance with all Federal, State, and Local Laws and Regulations.

5.C. Effects of delayed maintenance on Device structural integrity, performance, odors.

Delayed maintenance may cause the MB to become completely full of material thereby causing stormwater to bypass the filter system and the Device not performing as designed. It is unlikely that a completely full MB will affect the structural integrity of the Device because of its solid frame suspension system and configuration. The MB will drain between rainstorms but there may be trash within the bag that holds water and causes odors. Performance and odor problems can be solved by more frequent servicing of the Device.

Maintenance Troubleshooting:

- Pooling of water inside of a MB is most likely indicative of:
 - A full MB that needs emptying or replacement;
 - A TDS-MB model with a sediment capture liner with too fine of filter is clogging due to hydrocarbon loading. A coarser filter material can be substituted or MYCELX can be added to the filter chain to remove hydrocarbons before they foul the sediment liner. A sediment liner is not required for full trash capture.
- Pooling of water below the Device can be caused from the catch basin sump or irregularities in the catch basin construction;

- Pollution or vegetation accumulating on the progressive overflow trash screen is most likely indicative of a weather event in excess of the design storm or a full MB that needs emptying or replacement;
- A compromised MB is likely indicative that it has exceeded its specified service life.

5.D. Device maintenance and vector control accessibility

- 1) FCP originally submitted a vector control application for the DIF Device to the Mosquito Vector Control Association of California (MVCAC) on June 26th, 2019. FCP resubmitted the application on November 6th, 2019.
- 2) MVCAC originally denied approval of the application because FCP did not specify the sample port size. There was also concerns that the original hinged sampling port on the filter hanger may be difficult to operate. FCP had multiple communications by phone and in person with several MVCAC personnel to better understand their operational requirements for vector control. Based upon these conversations, FCP revised the sample port design and provided information to MVCAC personnel for their review and approval at the 2019 CASQA conference. All MVCAC personnel who reviewed the Device determined the sampling port options that FCP offers are an acceptable means to perform vector operations and were satisfied with their ease of operation and accessibility. FCP subsequently revised the MVCAC application and re-submitted it for approval on 6Nov2019. FCP currently awaits their review and approval. A video explaining how the vector control sampling ports work can be found at this link: <https://www.youtube.com/watch?v=k952B-kW9Qg&feature=youtu.be>
- 3) Neither the diverter screen nor the inlet screen affects the means by which vector control accesses the sampling port. Vector control personnel can operate any of the vector control sampling port options with either the diverter screen or the inlet screen present.
- 4) See Appendix E for the updated MVCAC application.

5.E. Repair procedures for the Device's structural components.

To repair a worn or broken part of the Device, one must simply remove the Device from the catch basin and identify the part that needs replacement. Because of the Device's modular design, usually only a small part may need to be replaced rather than the whole unit. Take pictures and measurements of the part and contact FCP for a replacement part and instructions for repair. FCP offers a 7-year warranty as described in Section 6.C.

6.0 Reliability Information

6.A. Estimated design life of Device components before major overhaul.

The Device has a minimum design life of 25 years assuming the proper installation, maintenance and service of the Device. The total trash capture (TTC-MB model) MBs are reusable and have a service life of one (1) to two (2) years, depending upon site conditions. Trash, debris and sediment (TDS model) MBs with a liner are generally single use filters because of their fine filtration capabilities and have a maximum service life of 12 months, depending upon site conditions. Major overhauls of the Device are not expected and FCP provides a 7-year warranty as described in 6.C.

6.B. Device sensitivity to loadings other than trash (i.e. leaves, sediment).

The Device has an excellent ability to capture vegetation (including leaves and grass clippings) with any MB model. The MB backflow preventer helps minimize or prevent loss of pollutants after capture. Typically, leaves and debris are quite bulky. Therefore, the maintenance frequency should be increased during seasonal leaf drop or after high wind events such as the Santa Ana winds. Delayed maintenance of the Devices in areas with high leaf drop can cause the storm grate to be covered with leaves and cause flooding. If a Device is seriously neglected, then debris may eventually clog the Device's overflow and cause flooding. Frequent and proper maintenance of the Devices will increase the likelihood of successful trash capture and high flow bypass.

Devices equipped with geotextile-lined MBs (TDS-MB) will also capture significant amounts of sediment. Therefore, maintenance frequency should be increased after sediment runoff causing events such as intense heavy rainfall, nearby construction activity, road sanding, chip sealing, etc.

One can switch or alternate the types of MB throughout the year. If the customer requires finer filtration most of the year to capture sediment, then the TDS-MB (trash, debris & sediment) is used. In the fall when leaves are dropping, then one can temporarily replace the TDS-MB with the TTC-MB (total trash capture) to capture particles 5mm or greater in size. This temporary replacement will allow finer particles to bypass the system. Advantageously, if the captured particles are mainly vegetative waste, then the customer may be able to compost the captured material.

In areas where hydrocarbons are prevalent and a TDS model MB is used, then one may require the use of MYCELX to remove hydrocarbons from the stormwater to prevent blinding of the filter due to hydrocarbon loading.

6.C. Warranty information.

The Device material and product construction are warranted for seven (7) years from the date of purchase. Device replacement parts will be supplied at no charge to the end user provided the Device unit was properly installed and serviced for its intended use as a full trash capture device per the Engineer's recommendations and as specified in this application or most current FCP product and service recommendations. MBs have a warranty on workmanship for one (1) year from date of install provided the customer properly records service details as recommended by FCP and/or the Engineer.

The Gutter Bin® stormwater filtration system Eco Drop Inlet Filter and Mundus Bag® water filter are pre-engineered filtration systems designed to meet site-specific water quality treatment requirements. Conformance with the Engineer's Plans and Specifications and the manufacturer's recommendations is essential to ensure proper operation and function of the Device.

6.D. Customer support information.

Frog Creek Partners corporate office is open during normal business hours. Customer support can be reached via telephone and/or email 24 hours per day and 7 days per week. Contact information:

Email: support@frogcreek.partners

Phone: 307-797-7720 or 307-439-9570

Website: www.frogcreek.partners

Frog Creek Partners maintains a nationwide agreement with APEX Companies to provide installation and service capabilities upon request. However, FCP, the city, the customer, or an approved local contractor can perform the install and maintenance as required by the Engineer or customer.

7. Field/Lab Testing Information and Analysis

7.A. Provide available field or lab testing information that demonstrates Device functionality and performance.

Appendix A contains the Device and field test results. Summary test results prove 100% trash capture and retention. Results = SUCCESSFUL TEST – PASS.

Please refer to Appendix B for third party certification of FCP's testing.

Multiple Device configurations successfully removed 100% of trash 5mm or greater in size from water flows ranging from 50 to 500 gpm in multiple third-party validated lab

tests. The tests were conducted in FCP's headquarters with a third-party professional engineer present to verify the test results. FCP used a "trash recipe" as recommended by Stormwater Environment Manufacturers Association (SWEMA). Two types of MBs were tested with the Device to ensure that both the Total Trash Capture (TTC-13) MB and Trash, Debris & Sediment (TDS-13) MB performed to State Water Resource Control Board ("SWRCB") requirements.

Overview of test platform and testing procedure for the FCP DIF and MB

An FCP Device measuring 36" x 24" was installed into a standard drop inlet located in the parking lot of the Frog Creek Partner's headquarters in Casper, Wyoming. The outlet pipe was covered with a 4mm mesh screen to prevent any loss of trash if it escaped the Device during the test. Tests were performed with the following inlet covering configurations:

- 1) No inlet covering;
- 2) Existing standard drop inlet cast iron grate; and
- 3) The optional Original Gutter Bin® (OGB) grate.

FCP used a "trash recipe" as prescribed by SWEMA. The trash recipe comprised of:

- 30 cigarette filters
- Six (6) pieces of paper cut into 2" wide by 12" long strips
- 10 wood popsicle sticks
- Six (6) pieces of plastic cup cut into 2" wide by 5" long strips
- Six (6) pieces of plastic bag cut into 2" wide by 12" long strips
- Six (6) pieces of cardboard cut into 2" wide by 8" long strips
- Six (6) pieces of cloth cut into 2" wide by 12" long strips
- six (6) pieces of aluminum cans cut into 2" wide by 5" long strips
- 15 pieces of Styrofoam packing peanuts

FCP endeavored to re-use as many of the trash recipe components from one test to the other to simulate weathering in the field. FCP found it necessary to replace some pieces of cardboard and paper between tests because of deterioration.

Prior to each test, the entire trash recipe was laid out on a table and organized by material type. Each piece was counted, and the trash recipe was recorded and photographed to get a "before picture". The trash recipe was mixed with water in a 5-gallon bucket and set aside until introduced to the test platform. FCP kept detailed notes on individual data worksheets recording the trash count (before & after), water flow, device type, witness, filter type, date, time, and any relevant notes from each test.

Water was introduced into the test platform upstream of the DIF in several ways to achieve the desired flowrate. A 3" hose from an adjustable hydrant meter was able to produce flows between 50 gpm to 350 gpm. In higher flow tests, FCP used a water truck with either gravity flow or pressurized flow to gain larger flowrates up to an additional 150 gpm. A garden hose was used intermittently with a flow rate ranging from 13 to 15 gpm. When the desired flowrate was steady, FCP personnel introduced the 5-gallon bucket with trash recipe into the water flow upstream of the Device and MB. Multiple video cameras were used to capture visual data. A virtual reality camera was placed next to the Device on the sidewalk showing an unobstructed 360-degree view of the test. Another camera was placed directly above the Device to capture the introduction of water and trash into the Device in detail. To simulate high flow, FCP ran both the hydrant meter hose and pressurized water truck hose onto the test platform upstream of the Device with all water going into the inlet. A 4mm screen covered the catch basin outlet to capture any pollutants that may have bypassed the Devices during testing.

When each test was completed, FCP personnel removed the MB and any trash residing on the grate, the filter hanger and/or the progressive overflow trash screen from the Device and dumped the captured trash onto a table. Each piece of trash was organized, counted, recorded and then photographed for an "after picture". All trash 5mm and greater in size was captured by the Device during each test.

FCP performed tests 1 through 4 with an alternative overflow design utilizing a 4mm net that covered the entire space between the filter hanger and the UGF. The Device captured 100% of trash with sustained flows ranging from 200 to 350 gpm and a fully screened overflow.

FCP performed test 5 and 6 with an overflow design where the filter hanger did not embody a full trash net or progressive overflow trash screen. The Device captured 100% of trash with sustained flows ranging from 100 to 350 gpm with no screen around the filter hanger.

FCP performed test 7 through 10 with a progressive overflow trash screen (POTS) surrounding the top of the filter hanger perimeter. The POTS is made of 4.76mm (3/16") perforated stainless steel that extends approximately 50mm (2") above the filter hanger. The Device captured 100% of trash with sustained flows ranging from 50 to 500 gpm with a POTS.

100% trash capture test results = SUCCESSFUL - PASS TEST.

All Devices tested successfully captured 100% of trash in the lab. The Devices have also been tested for multiple seasons in snow, ice, rain and hail with successful trash

capture results and hydraulic capacity. FCP recommends a progressive overflow trash screen (POTS) for DIF or DIF-C Devices installed in California because of the added protection it affords the customer and watershed.

FCP tested two types of MBs in the Device trash capture test. Both the Total Trash Capture MB (TTC-16) and the Trash, Debris & Sediment MB (TDS-16) performed perfectly and the Device achieved 100% trash capture in every test. Both MBs also retained 100% of their trash even after the flow subsided to 0 gpm. Therefore, the Device and MBs achieved 100% trash capture and retention in all tests.

A third-party professional engineer was present to independently verify that the Frog Creek Partners' products did indeed pass the trash capture test as required by the California State Water Resources Control Board. The third-party professional engineer's certification letter can be found in Appendix B.

All tests of the Device and MB were filmed. FCP can provide YouTube links to these videos upon request. Select pictures of the trash capture test and results can be found in Appendix A. The Gutter Bin® stormwater filtration system and Mundus Bag® water filter are patent pending and registered trademarks of Frog Creek Partners, LLC. All pictures and content of this application are copyrighted by Frog Creek Partners, LLC 2019.

Get Your Mind into the Gutter™

Because Clean Water is a Good Thing™

Testing Photographs



Image 17 - Adjustable hydrant meter water source - up to 350 gpm



*Image 18 - Combined test water sources output. Adjustable hydrant meter max capacity 350 GPM
Pressurized water truck max capacity 150 gpm*



Image 19 - 500 gpm test of Device. Prior to the introduction of simulated trash



Image 20 - 500 gpm test of Device. Introducing simulated trash recipe



Image 21 - 500 gpm test of Device. Close-up of simulated trash entering Device thru storm grate



Image 22 - 500 gpm test of Device showing trash entering Device



Image 23 - Device equipped with optional OGB grate during a 350 gpm test



Image 24 – Device in round catch basin. Vector control achieved around filter hanger as one can see the bottom of the catch basin from above.

APPENDIX A - TEST RESULTS

Data worksheet for Gutter Bin 100% trash capture test

Frog Creek Partners, LLC

Casper, Wyoming USA

Testing completed by: BDeurloo, CTipple

Testing witnessed by: Dr. Dave Bell, PE

Test #	1		
Device:	Gutter Bin® - Eco Drop Inlet Filter (DIF)		
Filter Media:	Mundus Bag™ - Total Trash Capture (TTC-12)		
Date:	18-Apr-2019		
Time:	9:30 AM		
Flow Rate (before test):	200 gpm	757 l/min	0.45 cfs
Flow Rate (during test):	200 gpm	757 l/min	0.45 cfs
Flow Rate (after test):	200 gpm	757 l/min	0.45 cfs

Component	Pre-Test Count	Post-Test Count	Test Outcome
Cigarette Filter	30	30	PASS
Newspaper	6	6	PASS
Wood (popsickle stick)	10	10	PASS
Plastic (Moldable)	6	6	PASS
Plastic (Film)	6	6	PASS
Cardboard	6	6	PASS
Cloth	6	6	PASS
Metal (folded foil)	6	6	PASS
Styrofoam	15	15	PASS

Comments: Hydrant water only. Performed test with no stormgrate on DIF to watch flow characteristics and allow trash to flow in at full speed. Trash skirt covering entire overflow. Replaced 1 piece cardboard because it deteriorated. 100% trash capture and retention. SUCCESSFUL TEST - PASS

Test #	2		
Device:	Gutter Bin® - Eco Drop Inlet Filter (DIF)		
Filter Media:	Mundus Bag™ - Total Trash Capture (TTC-12)		
Date:	18-Apr-2019		
Time:	9:55 AM		
Flow Rate (before test):	350 gpm	1325 l/min	0.78 cfs
Flow Rate (during test):	350 gpm	1325 l/min	0.78 cfs
Flow Rate (after test):	350 gpm	1325 l/min	0.78 cfs

Component	Pre-Test Count	Post-Test Count	Test Outcome
Cigarette Filter	30	30	PASS
Newspaper	6	6	PASS
Wood (popsickle stick)	10	10	PASS
Plastic (Moldable)	6	6	PASS
Plastic (Film)	6	6	PASS
Cardboard	6	6	PASS
Cloth	6	6	PASS
Metal (folded foil)	6	6	PASS
Styrofoam	15	15	PASS

Comments: Hydrant water only. Performed test with no stormgrate on DIF to watch flow characteristics and allow trash to flow in at full speed. Trash skirt covering entire overflow. 100% trash capture and retention. SUCCESSFUL TEST - PASS

Test #	3			
Device:	Gutter Bin® - Eco Drop Inlet Filter (DIF) & OGB			
Filter Media:	Mundus Bag™ - Total Trash Capture (TTC-12)			
Date:	18-Apr-2019			
Time:	10:30 AM			
Flow Rate (before test):	350 gpm	1325 l/min	0.78 cfs	
Flow Rate (during test):	350 gpm	1325 l/min	0.78 cfs	
Flow Rate (after test):	350 gpm	1325 l/min	0.78 cfs	

Component	Pre-Test Count	Post-Test Count	Test Outcome
Cigarette Filter	30	30	PASS
Newspaper	6	6	PASS
Wood (popsickle stick)	10	10	PASS
Plastic (Moldable)	6	6	PASS
Plastic (Film)	6	6	PASS
Cardboard	6	6	PASS
Cloth	6	6	PASS
Metal (folded foil)	6	6	PASS
Styrofoam	15	15	PASS

Comments: Hydrant water only. Performed test with Original Gutter Bin® grate over DIF. Replaced 1 piece of cardboard because it deteriorated. 100% trash capture and retention. SUCCESSFUL TEST - PASS

Test #	4			
Device:	Gutter Bin® - Eco Drop Inlet Filter (DIF)			
Filter Media:	Mundus Bag™ - Total Trash Capture (TTC-12)			
Date:	18-Apr-2019			
Time:	11:30 AM			
Flow Rate (before test):	350 gpm	1325 l/min	0.78 cfs	
Flow Rate (during test):	350 gpm	1325 l/min	0.78 cfs	
Flow Rate (after test):	350 gpm	1325 l/min	0.78 cfs	

Component	Pre-Test Count	Post-Test Count	Test Outcome
Cigarette Filter	30	30	PASS
Newspaper	6	6	PASS
Wood (popsickle stick)	10	10	PASS
Plastic (Moldable)	6	6	PASS
Plastic (Film)	6	6	PASS
Cardboard	6	6	PASS
Cloth	6	6	PASS
Metal (folded foil)	6	6	PASS
Styrofoam	15	15	PASS

Comments: Hydrant water only. Performed test with cast iron grate over DIF and trash skirt covering entire overflow. 1 piece of cardboard split in 2. If trash was in contact with grate at end of test (even if not in the Mundus Bag & still on top) we considered the trash captured. 100% trash capture and retention. SUCCESSFUL TEST - PASS

Test #	5			
Device:	Gutter Bin® - Eco Drop Inlet Filter (DIF)			
Filter Media:	Mundus Bag™ - Total Trash Capture (TTC-12)			
Date:	18-Apr-2019			
Time:	11:50 AM			
Flow Rate (before test):	100 gpm	379 l/min	0.22 cfs	
Flow Rate (during test):	100 gpm	379 l/min	0.22 cfs	
Flow Rate (after test):	100 gpm	379 l/min	0.22 cfs	

Component	Pre-Test Count	Post-Test Count	Test Outcome
Cigarette Filter	30	30	PASS
Newspaper	6	6	PASS
Wood (popsickle stick)	10	10	PASS
Plastic (Moldable)	6	6	PASS
Plastic (Film)	6	6	PASS
Cardboard	6	6	PASS
Cloth	6	6	PASS
Metal (folded foil)	6	6	PASS
Styrofoam	15	15	PASS

Comments: Hydrant water only. Performed test with no grate over DIF and no trash skirt covering overflow (open overflow). Replaced 1x paper after test because it deteriorated. 100% trash capture and retention. SUCCESSFUL TEST - PASS

Test #	6			
Device:	Gutter Bin® - Eco Drop Inlet Filter (DIF)			
Filter Media:	Mundus Bag™ - Total Trash Capture (TTC-12)			
Date:	18-Apr-2019			
Time:	12:45 PM			
Flow Rate (before test):	350 gpm	1325 l/min	0.78 cfs	
Flow Rate (during test):	350 gpm	1325 l/min	0.78 cfs	
Flow Rate (after test):	350 gpm	1325 l/min	0.78 cfs	

Component	Pre-Test Count	Post-Test Count	Test Outcome
Cigarette Filter	30	30	PASS
Newspaper	6	6	PASS
Wood (popsickle stick)	10	10	PASS
Plastic (Moldable)	6	6	PASS
Plastic (Film)	6	6	PASS
Cardboard	6	6	PASS
Cloth	6	6	PASS
Metal (folded foil)	6	6	PASS
Styrofoam	15	15	PASS

Comments: Hydrant water only. Performed test with DIF and no grate to watch water flow and allow full velocity water/trash entry into DIF. Device caught all trash during the test. One cigarette butt was caught between the Mundus Bag the the DIF frame. It fell into catch basin after test completed and when filter media was pulled out. It is considered captured. 100% trash capture and retention. SUCCESSFUL TEST - PASS

Test #	7			
Device:	Gutter Bin® - Eco Drop Inlet Filter (DIF)			
Filter Media:	Mundus Bag™ - Total Trash Capture (TTC-12)			
Date:	18-Apr-2019			
Time:	1:30 AM			
Flow Rate (before test):	350 gpm	1325 l/min	0.78 cfs	
Flow Rate (during test):	350 gpm	1325 l/min	0.78 cfs	
Flow Rate (after test):	350 gpm	1325 l/min	0.78 cfs	

Component	Pre-Test Count	Post-Test Count	Test Outcome
Cigarette Filter	30	30	PASS
Newspaper	6	6	PASS
Wood (popsickle stick)	10	10	PASS
Plastic (Moldable)	6	6	PASS
Plastic (Film)	6	6	PASS
Cardboard	6	6	PASS
Cloth	6	6	PASS
Metal (folded foil)	6	6	PASS
Styrofoam	15	15	PASS

Comments: Hydrant water only. Performed test with cast iron grate, and new dual stage adjustable overflow that covered the bottom portion of overflow. 100% trash capture and retention. SUCCESSFUL TEST - PASS

Test #	8			
Device:	Gutter Bin® - Eco Drop Inlet Filter (DIF)			
Filter Media:	Mundus Bag™ - Total Trash Capture (TTC-12)			
Date:	19-Apr-2019			
Time:	7:15 AM			
Flow Rate (before test):	50 gpm	189 l/min	0.11 cfs	
Flow Rate (during test):	50 gpm	189 l/min	0.11 cfs	
Flow Rate (after test):	50 gpm	189 l/min	0.11 cfs	

Component	Pre-Test Count	Post-Test Count	Test Outcome
Cigarette Filter	30	30	PASS
Newspaper	6	6	PASS
Wood (popsickle stick)	10	10	PASS
Plastic (Moldable)	6	6	PASS
Plastic (Film)	6	6	PASS
Cardboard	6	6	PASS
Cloth	6	6	PASS
Metal (folded foil)	6	6	PASS
Styrofoam	15	15	PASS

Comments: Hydrant water only. Performed test with cast iron grate, and new dual stage adjustable overflow that covered the bottom portion of overflow. Most trash caught on grate because of low flow. Discovered 2 styrofoam pieces & 1 aluminum piece in orange bucket shortly after full water volume subsided. Threw trash into flowing water flow at end of test. DIF and MB captured. 100% trash capture and retention. SUCCESSFUL TEST - PASS

Test #	9			
Device:	Gutter Bin® - Eco Drop Inlet Filter (DIF)			
Filter Media:	Mundus Bag™ - Trash, Debris & Sediment (TDS-12)			
Date:	19-Apr-2019			
Time:	7:35 AM			
Flow Rate (before test):	500 gpm	1893 l/min	1.11 cfs	
Flow Rate (during test):	500 gpm	1893 l/min	1.11 cfs	
Flow Rate (after test):	500 gpm	1893 l/min	1.11 cfs	

Component	Pre-Test Count	Post-Test Count	Test Outcome
Cigarette Filter	30	30	PASS
Newspaper	6	6	PASS
Wood (popsickle stick)	10	10	PASS
Plastic (Moldable)	6	6	PASS
Plastic (Film)	6	6	PASS
Cardboard	6	6	PASS
Cloth	6	6	PASS
Metal (folded foil)	6	6	PASS
Styrofoam	15	15	PASS

Comments: Hydrant full open = 350gpm, Water truck with pump on = 135 gpm, plus garden hose = 15 gpm. Performed test with cast iron grate, and new dual stage adjustable overflow that covered the bottom portion of overflow. Used fire hydrant water, pressurized water truck, and garden hose for water flow. 100% trash capture and retention. SUCCESSFUL TEST - PASS

Test #	10			
Device:	Gutter Bin® - Eco Drop Inlet Filter (DIF) & OGB			
Filter Media:	Mundus Bag™ - Trash, Debris & Sediment (TDS-12)			
Date:	19-Apr-2019			
Time:	8:15 AM			
Flow Rate (before test):	350 gpm	1325 l/min	0.78 cfs	
Flow Rate (during test):	350 gpm	1325 l/min	0.78 cfs	
Flow Rate (after test):	350 gpm	1325 l/min	0.78 cfs	

Component	Pre-Test Count	Post-Test Count	Test Outcome
Cigarette Filter	30	30	PASS
Newspaper	6	6	PASS
Wood (popsickle stick)	10	10	PASS
Plastic (Moldable)	6	6	PASS
Plastic (Film)	6	6	PASS
Cardboard	6	6	PASS
Cloth	6	6	PASS
Metal (folded foil)	6	6	PASS
Styrofoam	15	15	PASS

Comments: Hydrant full open = 350gpm. Performed test with Original Gutter Bin® grate, and new dual stage adjustable overflow that covered the bottom portion of overflow. 100% trash capture and retention. SUCCESSFUL TEST - PASS

APPENDIX B - CERTIFICATION OF FIELD TEST RESULTS

David Bell, PhD, PE
David A. Bell Associates, Inc.
542 South 350 East
Farmington, UT 84025
801.540.8742

To whom it may concern:

The Frog Creek Partners ("FCP") patent pending Gutter Bin® Eco Drop Inlet Filter (DIF), the Original Gutter Bin® (OGB) grate, and the patent pending Mundus Bag™ water filter were tested on April 18, 2019.

Frog Creek Partners (FCP) has determined that the *Storm Water Equipment Manufacturers Association (SWEMA)'s Laboratory Protocol and trash recipe* provides a strong baseline testing method for confirming a 100% trash capture in accordance with the California State Water Board's current requirements. FCP's testing was fundamentally based on the SWEMA protocol and followed best reasonable practice throughout the entirety of the trash capture test regime.

I am a professional engineer with more than 30 years of water-related product design and field/deployment and process validation testing. FCP asked if I would be an independent witness and third party observer/resident expert. I am registered as a Professional Engineer in Utah and Wyoming. My PhD and research specialty is computational fluid dynamics. I have been involved in projects involving blood flow in the tissues, produced water reclamation in the oil and gas field and the modeling of multi-contaminant, turbulent wastewater flows. I have numerous patents relating to this work covering years of field experience.

Now, under my observation, FCP's DIF and multiple Mundus Bag™ configurations passed all testing regimes without failure when subjected to water flow rates ranging from 50 gallons per minute (50 GPM) to 500 GPM. At no time during these tests, using simulated trash and conducted in accordance with the SWEMA Laboratory Protocol, were any escaping trash particulates observed.

In concurrence and observation with testing I can attest that the Frog Creek Partners Gutter Bin® Eco Drop Inlet Filter (DIF), the Original Gutter Bin Grate (OGB), and the Mundus Bag™ water filter passed all testing protocols and procedures as outlined in the document without any failure. I neither asked for nor received any compensation or remuneration for my observations.

Sincerely,



Date: 5/6/19

David A. Bell, PhD, PE
David A. Bell Associates, Inc.
1920 Plateau St.
Laramie, WY 82070
542 So 350 E
Farmington, UT 84025
801.540.8742



APPENDIX C - SPECIFICATION SHEETS & ENGINEERING DRAWINGS

Eco Drop Inlet Filter (DIF) Gutter Bin® Stormwater Filtration System



100% TRASH CAPTURE RATED

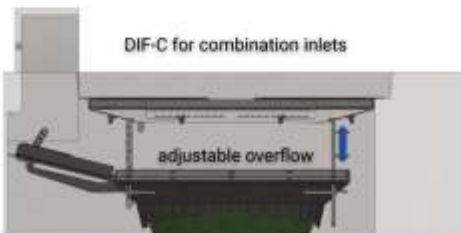
The patent pending Gutter Bin Eco Drop Inlet Filter provides unparalleled protection and accepts the full line of Mundus Bag® water filters.

Product Highlights

- Flexible design fits under existing storm grate in a drop inlet or combo inlet (DIF-C) with bent or flat frame
- Largest adjustable overflow on the market; meets or exceeds hydraulic capacity of the catch basin
- Dual stage overflow provides superior trash capture while maintaining hydraulic capacity
- Stainless steel, weathering steel and/or plastic construction to meet local & federal regulations
- HS-20 load rated - installs below existing storm grate
- Easily removed for maintenance, relocation, or TV camera access
- Optional sampling port - can be used for vector control
- Variable depth for deep or shallow catch basins
- Compatible with 9, 13, 14 & 16 inch Mundus Bag
- Rectangular and round models
- Can be used in conjunction with connector pipe screens (CPS) and automatic retractable screens (ARS)
- Can be used as a pre-treatment solution for downstream filtration systems
- 7 year limited warranty

Installation and Servicing

- 5 minute install - **no** confined space entry, catch basin retrofit, or drilling required
- Servicing performed in 2 minutes or less
- Service interval depends upon climate, pollutant load, & infrastructure constraints
- To service: remove grate, remove and replace soiled Mundus Bag, replace grate



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DIF - for circular inlets

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Original Gutter Bin (OGB)

Gutter Bin® Stormwater Filtration System



100% TRASH CAPTURE RATED

The patent pending Original Gutter Bin model provides unparalleled protection and accepts the full line of Mundus Bag® water filters.

Product Highlights

- Flexible design replaces existing storm grate in a drop inlet or combo inlet with bent or flat frame
- Hinged access hatch for quick service
- Largest adjustable overflow on the market; meets or exceeds hydraulic capacity of the catch basin
- Dual stage overflow provides superior trash capture while maintaining hydraulic capacity
- Stainless steel and/or weathering steel construction
- HS-20 load rated - replaces existing storm grate
- Easily removed for maintenance, relocation, or TV camera access
- Optional sampling port - can be used for vector control
- Variable depth for deep or shallow catch basins
- Compatible with 9, 13 and 14 inch Mundus Bag
- Rectangular and round models
- 7 year limited warranty
- Functional art design builds public awareness

Installation and Servicing

- 5 minute install - no confined space entry, catch basin retrofit, or drilling required
- Servicing performed in 2 minutes or less
- Service interval depends upon climate, pollutant load, & infrastructure constraints
- To service: open hatch, remove and replace soiled Mundus Bag, close hatch



Frog Creek Partners OGB

Customized designs available for sponsorship



Denver Zoo zebra edition OGB



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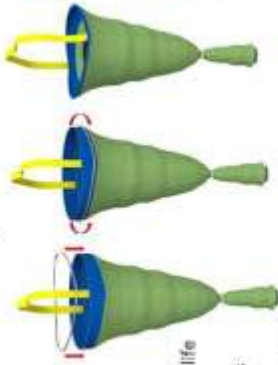
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Mundus Bag™

Gutter Bin® Filtration Media

100% TRASH CAPTURE

The patent pending Mundus Bag™ water filter removes a broad spectrum of sediment, trash and hydrocarbons from stormwater. It integrates fully with the complete line of Gutter Bin stormwater filtration systems.



Product Specifications

- Adjustable backflow preventer
- Variable depth for deep or shallow catch basins
- Integrated lifting straps for quick removal
- UV resistant durable construction for extended field life
- Single use and reusable models available
- Easily weighed for measurable & quantifiable results
- Cleaned by dumping, vac truck or bag replacement
- To service: load Mundus Hoop, wrap anchor, ready to filter

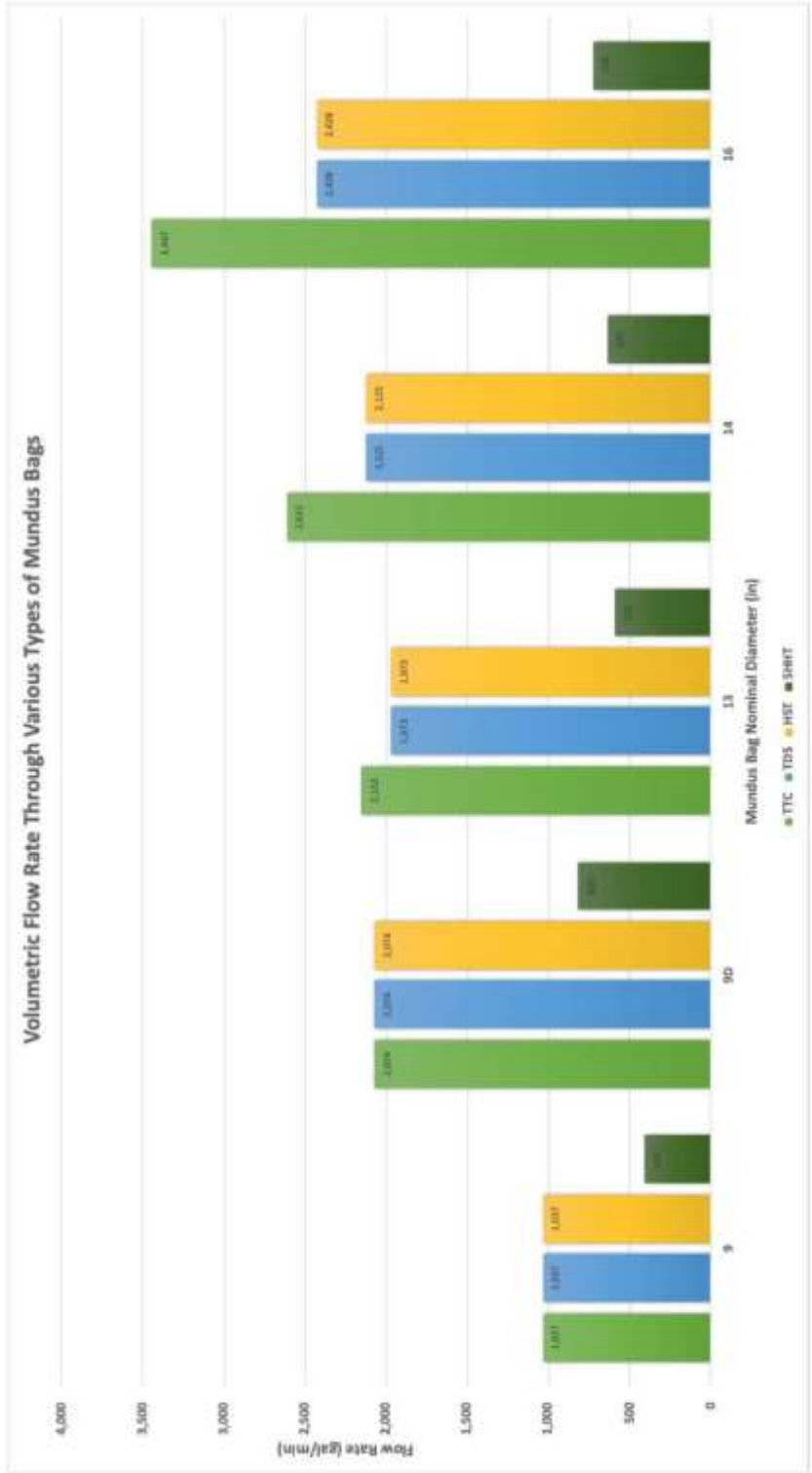


Targeted Pollutants	Model	Filter Media
100% Total Trash Capture (Trash & debris > 4mm)	TTC	polypropylene net
Trash, Debris & Sediment (80% TSS capture)	TDS	geofabric
Hydrocarbons, Sediment, & Trash	HST	Mycotic geofabric
Sediment, Hydrocarbons, Heavy Metals, & Trash	SHHT	Granulated activated carbon, adsorbent, Mycotic geofabric

Model	Bag dia (inches)	Max capacity (cuft)	Aperture size - particle retention (mm) (X 1000 for micron)	Min/Max length of filter (ft)	Max capture load (lbs)	Max load rating of filter bag (lbs)	Empty bag flow rate (gpm)	Reusable	Est. useful life (months)
TTC-9	9	1.77	3.5	32/40	33	291	1,067	Yes	6-18
TTC-9P*	9P	1.77	3.5	32/48	33	291	2,074	Yes	6-18
TTC-13	13	3.14	3.5	32/48	50	517	2,153	Yes	6-18
TTC-14	14	4.27	3.5	32/48	80	784	2,615	Yes	6-18
TTC-16	16	5.58	3.5	32/48	104	920	3,447	Yes	6-18
TDS-9	9	1.77	0.21	32/48	242	291	1,067	No	3-12
TDS-9P*	9P	1.77	0.21	32/48	242	291	2,074	No	3-12
TDS-13	13	3.14	0.21	32/48	431	517	1,935	No	3-12
TDS-14	14	4.27	0.21	32/48	587	784	3,125	No	3-12
TDS-16	16	5.58	0.21	32/48	766	920	2,428	No	3-12
HST-9	9	1.77	0.21	32/48	242	291	1,067	Partial	3-12
HST-9P*	9P	1.77	0.21	32/48	242	291	2,074	Partial	3-12
HST-13	13	3.14	0.21	32/48	431	517	1,935	Partial	3-12
HST-14	14	4.27	0.21	32/48	587	784	3,125	Partial	3-12
HST-16	16	5.58	0.21	32/48	766	920	2,428	Partial	3-12
SHHT-9	9	1.41	0.10	24/72	194	220	410	Partial	3-12
SHHT-9P*	9P	1.41	0.10	24/72	194	220	826	Partial	3-12
SHHT-13	13	2.51	0.10	24/72	242	414	581	Partial	3-12
SHHT-14	14	3.42	0.10	24/72	242	563	637	Partial	3-12
SHHT-16	16	4.47	0.10	24/72	597	726	728	Partial	3-12

* 9.0: two 9 inch diameter Mundus Bags™ installed side by side in a single Gutter Bin

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Notes:

- Table data based on field trials, model data and vendor specifications
- Geofabric aperture size may be customized for customer requirements (i.e. 80% TSS removal)- may affect differential pressure
- Bags can be cut or secured to desired length for short install
- 9D: two 9" diameter Mundus Bags™ installed side by side in a single Gutter Bin
- Mundus Bag can be configured with an RFID for greater tracking abilities



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APPENDIX D - VECTOR CONTROL APPLICATION

The FCP DIF and DIF-C was submitted to the MVCAC on November 6th, 2019. The Device spec sheets originally included in the application are not included here because they are included in Appendix C above. The application is included below:



FROG CREEK PARTNERS

Mosquito Vector Control Accessibility Application for Gutter Bin® Eco Drop Inlet Filter (DIF and DIF-C) and Mundus Bag® water filter

Seeking approval from the Mosquito Vector Control Association of California confirming the patent pending Gutter Bin® stormwater filtration system Eco Drop Inlet Filter and Mundus Bag® water filter are readily accessible for vector observation and treatment; or that the Devices do not require mosquito vector control accessibility



Frog Creek Partners, LLC
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November 6th, 2019

Dear Director Achermann and members of the Association:

Frog Creek Partners (FCP), LLC respectfully re-submits this application for approval to the Mosquito Vector Control Association of California (MVCAC) for the Gutter Bin® Eco Drop Inlet Filter (DIF), Gutter Bin® Eco Drop Inlet Filter for combination inlets (DIF-C) and the Mundus Bag® (MB) water filter (collectively "Devices"). The patent pending Devices are a stormwater filter system for drop inlet style storm drains that remove pollutants from stormwater and results in cleaner rivers and oceans. The system offers access to the bottom of a catch basin for vector control observation and/or treatment.

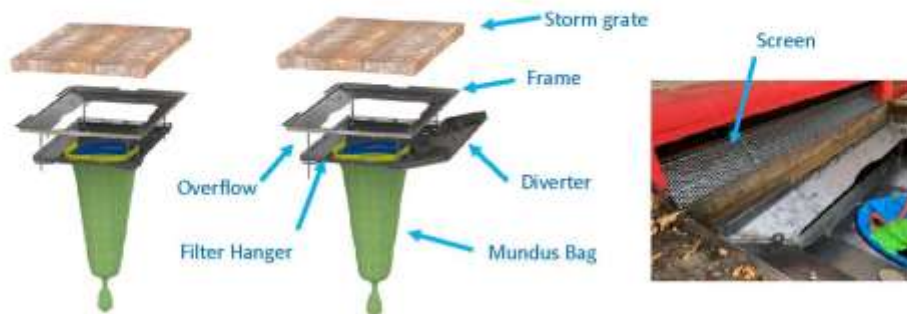


Fig. 2 - DIF model with no screen or diverter

Fig. 1 - DIF-C model with optional diverter

Fig. 3 - DIF-C model with optional screen

The Devices are comprised of three (3) main parts:

- 1) a frame, overflow system, and filter hanger that diverts water and pollution into a water filter. The system is designed for permanent or temporary use;
- 2) a customizable and removable Mundus Bag® water filter that can remove pollution from flowing water; and
- 3) a reusable Mundus Hoop that connects the Gutter Bin to the Mundus Bag.

The Mundus Bag is a removable and customizable water filter media with a backflow preventer that works in conjunction with the Devices to remove trash, debris, sediment, hydrocarbons, and

heavy metals from stormwater. The City of Santa Maria and the Carpinteria Fire Department are currently performing pilot projects of the Devices in California.

The DIF is intended for use in drop inlet catch basins that do not have a curb inlet opening. The DIF-C is intended for use in drop inlet catch basins that also have a curb inlet opening (aka throat or curb cut). FCP offers two optional components to prevent pollution 5mm or greater in size from entering the curb inlet opening in a DIF-C application. One DIF-C optional component is a diverter attached to the filter hanger and positioned under the curb inlet opening. The second DIF-C optional component is a screen placed across the curb inlet opening that prevents pollution from entering the catch basin.

Access and Observation

It is necessary to provide more than one sampling port option to meet each customer's unique needs because there are many different catch basin configurations with different sized storm grates presently used in California. For this reason, FCP offers multiple sampling port configuration options for the DIF and DIF-C Devices. Each sampling port option offers an opening of at least 5" in diameter (unless specified otherwise by local or state regulations). A video explaining how the vector control ports work can be found at this YouTube video [link](https://www.youtube.com/watch?v=k952B-kW9Qg&feature=youtu.be) <https://www.youtube.com/watch?v=k952B-kW9Qg&feature=youtu.be>

The different sampling port configurations include:

1. **Pivot sampling port on filter hanger** – this sample port is located on the filter hanger of the Device and pivots about an axis. It can be opened and closed with the storm grate situated within the frame. To inspect the catch basin with the storm grate and Device in place, use a tool that can fit through a storm grate hole and rotate the sample port cover aside (see Image 3). The sample port is located on the Devices' filter hanger. Most any rod-like tool can open the sample port such as a long screwdriver, wood dowel, or a 1" diameter by 2-foot long PVC pipe. One will need to remove the storm grate if inserting anything larger than the size of a typical storm grate drain hole opening.



Fig. 4 - 5" diameter pivoting sample port on filter hanger in closed

Sample port cover movement



Fig. 5 - 5" diameter pivoting sample port on filter hanger in open

2. **Sliding sampling port on filter hanger (FCP recommended option)** – this sample port is located on the filter hanger of the Device and slides back and forth. It can be opened and closed with the storm grate in place. To inspect the catch basin with the storm grate and Device in place, use a tool that can fit through a storm grate hole and slide the sample port cover aside. The sample port is located on the Devices' filter hanger. Most any rod-like tool can open the sample port such as a long screwdriver, grate tool, or a 1" diameter by 2-foot long PVC pipe. One will need to remove the storm grate if inserting anything larger than the size of a typical storm grate drain hole opening.



Fig. 6 – 5" diameter sliding sample port on filter hanger in closed position

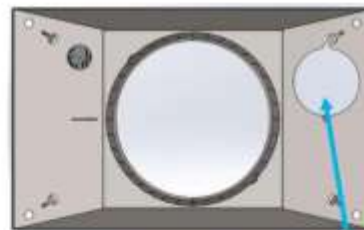


Fig. 7 – 5" diameter sliding sample port on filter hanger in open position

3. **Hinged sampling port on frame** - this sample port configuration is located on the frame of the Device and opens/closes by about a hinge by lifting/dropping the sample port cover. It cannot be opened/closed with the storm grate in place. One will need to remove the storm grate to access the sampling port.



Figure 8 - Overhead view of hinged sample port on frame in a closed position



Figure 9 – DIF with hinged sample port on frame in an open position

One can easily view or access the bottom of the catch basin while the Device and storm grate are in place through the Device's sample port to determine if water is present within the catch basin and to sample for vectors. The sample port is at least 5" in diameter (unless prescribed otherwise by regulations). Inspect the catch basin through the sample port. One can insert vector control

material through the sample port so it will drop directly into the bottom of the catch basin. The sample port can then be closed in the reverse order that it was opened.

In the event that the vector control technician must take a water sample or access the bottom of the catch basin with something that is larger than the typical storm grate hole, then the technician may need to remove the storm grate from the catch basin frame. It is understood that it is common for vector control technicians to use a sample bottle that is approximately 5-inches in diameter. Storm grates typically have less than 3-inch holes. In the event that the filter hanger dimensions of the Device cannot accommodate a 5-inch diameter sample port, then the sample port may need to be situated on the frame of the Device. In the unlikely event that this is the case, then the storm grate may need to be removed to open the sample port. Alternatively, the technician can remove the Mundus Bag® water filter to access the bottom of the catch basin. With the Mundus Bag removed, the vector control technician will have at least a 9-inch hole to access through the Device's filter hanger.

It should be noted that some catch basins may be inadequately constructed and may be prone to retaining small amounts of water. This can cause proliferation of mosquito breeding. The preferred course of action is to repair any deficiencies in the catch basin construction that may cause standing water prior to installation of the Devices. It is important that the deficient areas be visible and accessible by the mosquito vector control personnel if repairs to the catch basin have not occurred prior to Device installation.

Vector Control Treatment

Based upon the mosquito vector control technician's judgment, the vector control abatement may be placed in one of several locations related to the Devices:

- 1) Through the sample port opening so it drops into the bottom of the catch basin
- 2) inside the Mundus Bag;
- 3) on the filter hanger of the Device so the vector control material is washed into the catch basin during the next storm;
- 4) below the Device in the catch basin; or
- 5) attached to the exterior of the Mundus Bag's tail to act as a wick during moisture events.

A storm grate tool may be required to remove the storm drain cover and Mundus Bag. Other than that, no special tools or equipment are required.

Please refer to the pictures in Appendix A for more information

Optional Device Configurations

The Gutter Bin® DIF and DIF-C may include one or more of the following Device configurations:

1. **Sample Port Window** - The Device's sample port can be equipped with an optional viewing window made of clear acrylic so one does not have to open the sample port to see the bottom of the catch basin. Though this is not a preferred option because it can be difficult to see the bottom of the catch basin without some backlighting.

2. **Rigid Basket** – A perforated rigid metal basket may be used in lieu of a flexible Mundus Bag. This rigid basket is removed the same way as the flexible MB.
3. **Curb inlet screen and overflow** – a perforated screen is placed within the curb inlet opening of a combination drop inlet to prevent trash (5mm and greater) from entering the curb inlet opening while also allowing high water to overflow the screen (as shown in Figure 3 above). This screen system can be used in lieu of the diverter that attaches to the DIF filter hanger (as shown in Figure 2 above). This configuration allows the vector control technician to inspect and maintain the catch basin in the same way as described above.
4. **Original Gutter Bin® (OGB) grate** – Frog Creek Partners produces a customized storm grate with a hinged access hatch for more efficient means of accessing and maintaining the Mundus Bag. The original cast iron storm grate is replaced with the OGB. To access the catch basin and Mundus Bag, simply open the OGB access hatch by rotating it about a hinge. The access hatch can be locked open to prevent accidental closure while technicians are accessing the catch basin. Once the vector control technician completes his or her inspection/maintenance, lift the 35-pound access hatch up about ½ inch to disengage it from the lock and then slam it shut. The OGB is an optional component and not required for the Device to filter stormwater nor is it required for vector control accessibility. The MVCAC and SWRCB should not require the OGB to be installed with the DIF or DIF-C.



Figure 10 - DIF-C with optional OGB grate

Please refer to the specification sheets in Appendix B for more information

Please notify us at your earliest convenience when the Device is approved by MVCAC. Frog Creek Partners is applying to the California State Water Resources Control Board to gain approval of the same Devices for 100% trash capture certification.

We thank you for your time and attention while reviewing this application. We also thank you for the work that you do for public health and safety. Please call or email if you have any questions or comments.

Respectfully submitted,

Brian Deurloo
President
Frog Creek Partners, LLC

Appendix A - Photographs of Device



Image 1 - Mundus Bag® removal with storm grate removed



Image 2 - Overhead view of exposed DIF with closed sampling port and Mundus Bag in place



Image 3 - opening sample port through grate hole with 1" PVC pipe



Image 4 - top view of Device with Mundus Bag removed and sample port open that shows catch basin access



Image 5 - DIF equipped with an optional OGB grate



Image 6 - Opening the OGB hinged access hatch



Image 7 - Mundus Bag® removal thru the OGB hinged access hatch



Image 8 - Mundus Bag® removal thru the OGB hinged access hatch



Image 9 – Sample port being pivoted with grate in place to view bottom of catch basin



Image 10 – Opening the sample port through the optional OGB access grate.



Image 11 – View of the catch basin sump through the hinged sample port located on the frame.

APPENDIX E - FCP FIELD APP & DATA TRACKING FOR MEASURABLE RESULTS

The FCP Field App is a mobile app for use with any iOS or Android device. At its core, the FCP Field App functions as a central data store for surveyed inlet locations, installed Gutter Bins and MBs, and their related servicing visits. There are three (3) base data types:

1. Locations;
2. Gutter Bins; and
3. Visits.

Locations are specific sites where a Gutter Bin is or will be installed. Key Location data points include: latitude/longitude, measurements/dimensions, observations/notes and photo uploads.

Gutter Bins are records regarding a specific Gutter Bin. Key Gutter Bin data points include: Location (tied back to a specific Location record), serial number, install date, MB (number, type and size), observations/notes and photo uploads.

Visits are records regarding a specific visit to a Location. Key Visit data points include: Location (tied back to a specific Location record), Gutter Bin (tied back to a specific Gutter Bin record), visit date, visit type (installation, inspection, service), pollution recovered, MB type, personnel, observations/notes and photo uploads.

These three (3) base records allow FCP personnel equipped with the Field App to quickly access the data of any Gutter Bin (Device) and its accompanying service records.

FCP installs an identification badge on each Gutter Bin and assigns a unique serial number to help facilitate the customer's asset management. The serial number and date of manufacturer is stamped into a stainless-steel badge for easy viewing by the service professional.

The DIF and MB can be fitted with a data transmission device (DTD) like a radio frequency identification device (RFID), barcode, QR code, etc. The mobile device can capture individual DTD information and enter it into the FCP field app for information transfer to the customer's asset tracking system.

A customer version of the FCP Field App is available with the same functionality but limited only to customer-owned Gutter Bins (Devices).



Image 22 - Geographic overview of locations



Image 23 - List of locations grouped by city



Image 24 - Specific location in Santa Maria, CA

Thank you for taking the time to learn more about the Gutter Bin® stormwater filtration system and Mundus Bag® water filter.